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Chemical Week

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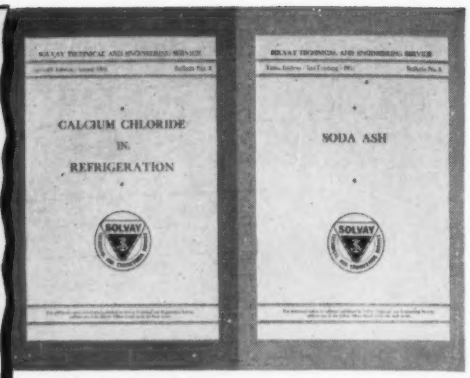

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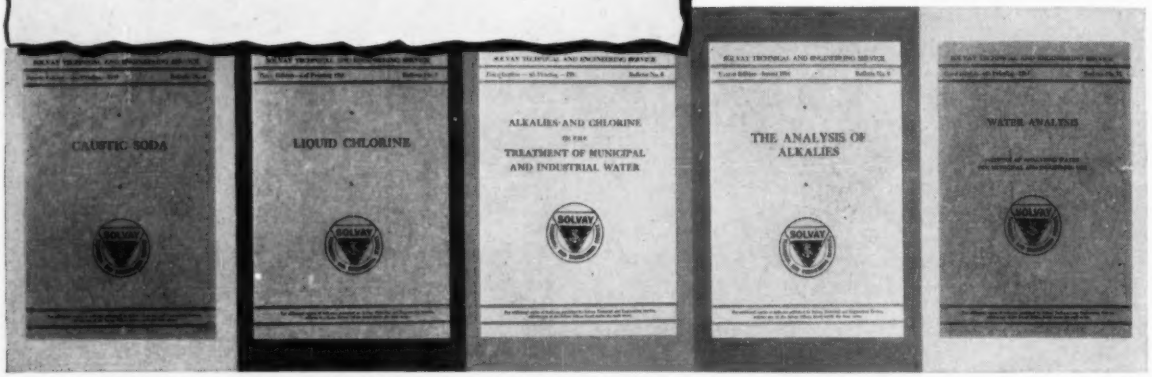

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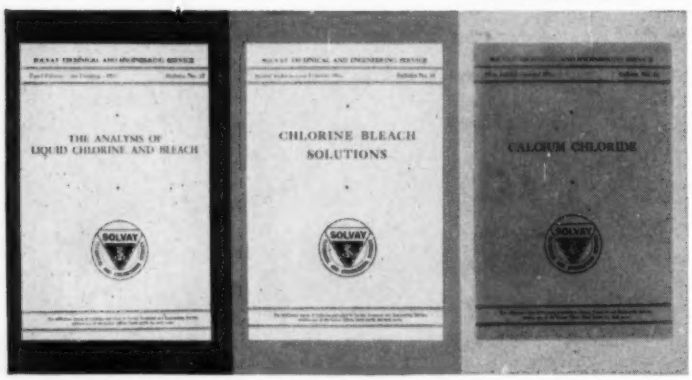

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You may never have occasion to place "white glove" requirements to the cleanness of your process equipment, steam generators, tanks and piping. But, if you do need this high degree of cleanness, Dowell can now offer it — as an additional service — in the chemical cleaning of *your* plant equipment.

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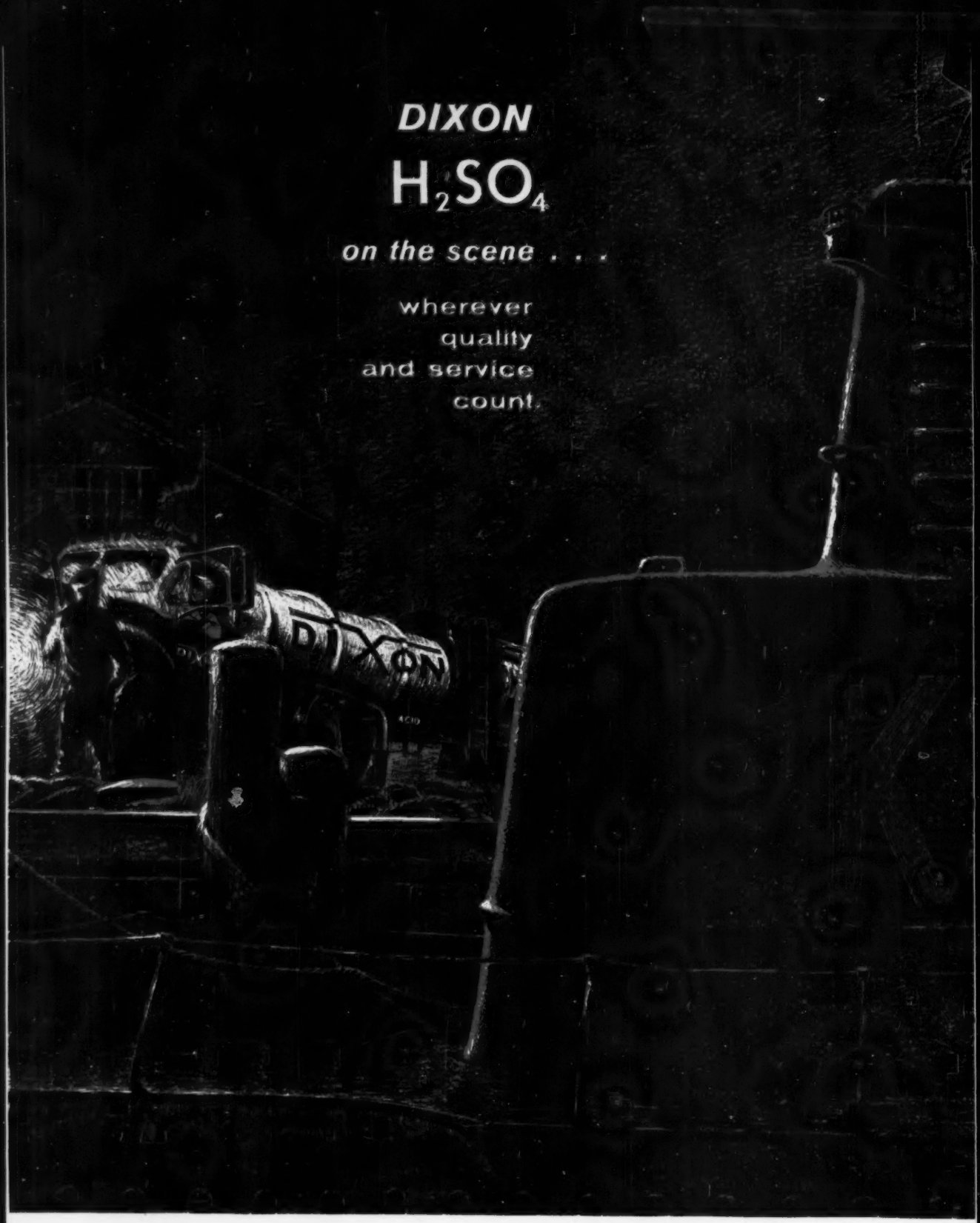

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Chemical Week

TOP OF THE WEEK

APRIL 18, 1959

- **Resurging sales in late '58** put sales, profit marks for most firms in chemical and allied industries at new highs .....**p. 38**
- **New corrosion-resistant titanium alloy** looks good for processing equipment. But some problems remain .....**p. 76**
- **Diamond Alkali's plan for licensing** processes and know-how provides some sound tips for other companies .....**p. 101**
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38 Final figures on fourth-quarter boom: high dollar-volume sales marks put CPI companies' profits back at '56 levels.

39 U.S. Public Health Service cracks down on 10 companies—shows federal interest, strength in pollution control.

39 The Du Pont antitrust marathon—judge now weighs rival plans for disposition of GM stock.

40 Chemists and engineers, 8,200 strong, throng to Boston for ACS meeting.

40 U.S. investors in Argentina wait out labor uprising blamed on Peronists and Reds.

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50 More Latin-American market troubles: Cuba considers hiking drug tariffs and forcing fertilizer price cuts.

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76 PRODUCTION
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Chemical Newsfront

FABRIC OF THE FUTURE may well be paper, if these hats of the future are any indication. Designed in paper and shown during the annual conventions of the paper industry, they use paper fabrics processed with MELOSTRENGTH® *resin* for durability in any weather. This melamine resin makes paper strong even when soaking wet. And advances in dyeing and printing make these treated paper fabrics resemble straw, silk or lace. Resistant to scuffing, moisture and acids, MELOSTRENGTH-treated paper finds use in seat covers, duck decoys, maps, freezer food wraps, towels, napkins, shipping bags—even clothes lines and sails.

(Industrial Chemicals Division)

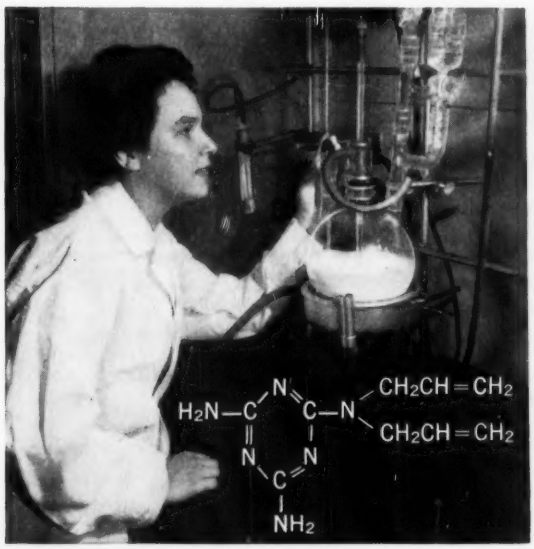
NEW SOURCE for urea of unusual quality is Cyanamid—AERO* *crystalline urea*. New paper chemicals, surface coatings, splicing and laminating adhesives and plastics have brought increasing demands for this versatile chemical. If you use urea, we would like you to know more about AERO crystalline urea, one of the purest grades commercially available. Write for technical information.

(Industrial Chemicals Division)

GREATER SAFETY AND CONVENIENCE in dispensing sterile sutures in the operating room are achieved with a recent improvement in suture packaging. Double SURGILOPE SP® envelopes, made of a flexible transparent plastic laminate, are replacing glass tubes, bulky glass jars and jar solutions. A dry, light, double envelope that may be stripped open delivers sterile sutures and eliminates the hazards of broken glass. A safer suture dispensing technique and greater economy are provided by this new suture package. **(Surgical Products Division)**

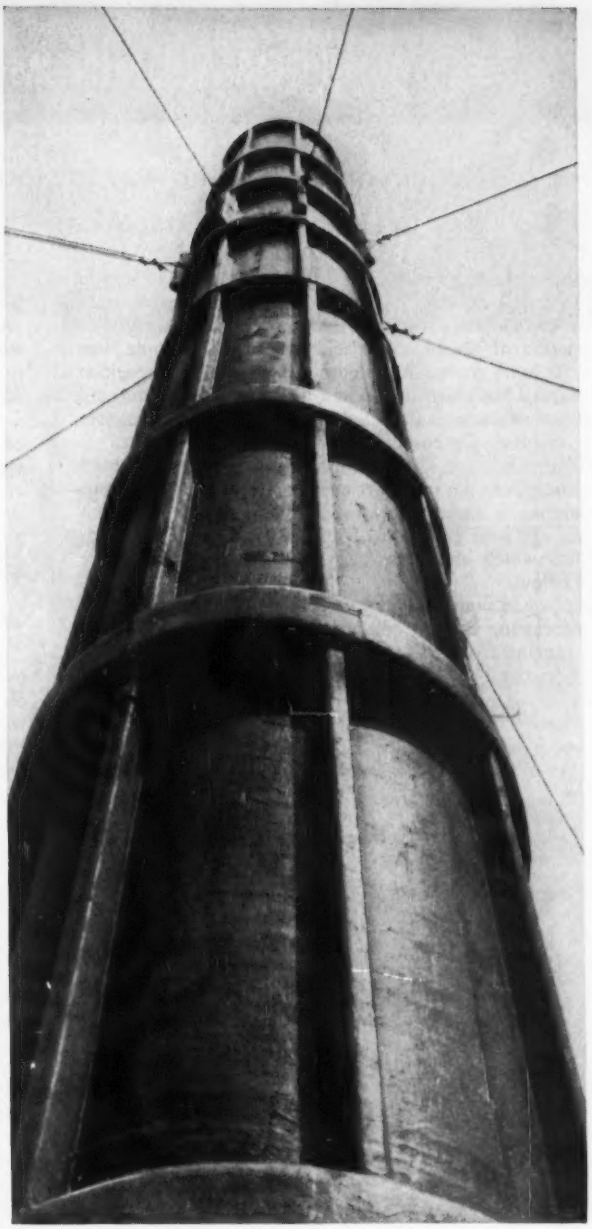
FAST COLORS IN LESS TIME mean economies for textile dyers using Cyanamid's CALCOFAST* *Neutral Wool Dyes* for wool, silk and nylon. Chemical and steam requirements are lower, adding to the labor savings of shorter dyeing time. The ten CALCOFAST Dyes now available offer a wide range of self shades and combination shades. More of these efficient dyes will become available as they move from research to plant production.

(Organic Chemicals Division)



NEW MULTIFUNCTIONAL CHEMICAL, *diallyl melamine,* offers many possibilities for preparation of plastics, ranging from clear molding compounds to laminating polymers. Diallyl melamine, one of many developed by Cyanamid's research laboratories, has both reactive double bonds and amino groups so that cross-linked and linear copolymers can be formed. If you have an interest in reactive monomers, send for technical information on this new polymerizable product.

(Market Development Department)



TOWERING PLASTIC STACK, fabricated entirely of reinforced LAMINAC® *polyester resin,* carries off highly corrosive gases such as hydrochloric acid and ammonia of chloride fumes. Made by Canbar Industrial Plastics of Canada, the stack is fabricated in three sections, stands 84 feet high. Unlike metal or brick stacks, the reinforced LAMINAC stack is highly resistant to corrosive attack and requires no maintenance. Lightweight, easily handled prefabricated components were installed in a few days.

(Plastics and Resins Division)

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For further information on these and other chemicals, call, write or wire American Cyanamid Company

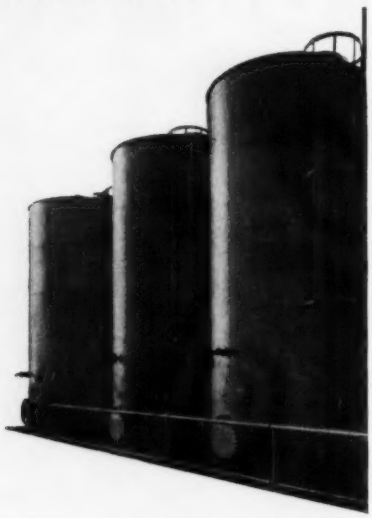
See why ALCOA ALUMINUM makes a good design habit

Requirement: A better way to store process liquids and gases
Key to Good Design: Use Alcoa Aluminum Storage Tanks

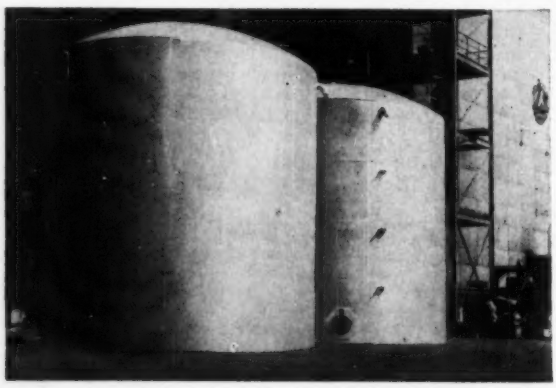
Whether product storage is an intermediate or final step in your processing operation, ALCOA® Aluminum Storage Tanks can help cut costs and maintain product purity. The production of glacial acetic acid is a prime example. For over 30 years ALCOA Aluminum tanks have been specified for storing this chemical because they resist corrosion and offer real economies in initial investment and in freedom from maintenance costs.

Thousands of aluminum tanks and tank cars have been constructed for the transport and storage of such chemicals as ammonium nitrate solutions, acrylonitrile, cryogenic substances and sour crude oils. Some of the many other products for which aluminum alloy tanks are well suited are listed below.

ALCOA can supply aluminum storage tanks for practically any processing application. They are made in a number of sizes ranging from 580 to 21,480 gal and are available in both horizontal and vertical construction.



Oleic acid is one of the many chemicals often stored in aluminum tanks. Aluminum preserves the color and purity of this product.



Fabricated from 3003 aluminum alloy, ALCOA Standard Storage Tanks measure 10 ft in diameter with varying lengths for different capacities. ALCOA also supplies special storage tanks to many processors. These can be furnished in intermediate lengths and capacities, and in a wide range of aluminum alloys for many process applications.

ALCOA engineers have worked closely with all segments of the process industries for over 40 years, and can help you specify the aluminum alloy storage tanks and other equipment best suited for your particular process application. ALCOA's unparalleled experience in this field is available to you for the asking. Write to the address on the coupon, stating your requirements as specifically as possible. ALCOA's development engineers will welcome the opportunity to work with you on your problems.

You can also take advantage of the wide selection of free ALCOA literature on aluminum for storage tanks and other process applications. Simply check the booklets you want on the coupon and mail to the address indicated. ALCOA will forward your material promptly and without obligation.

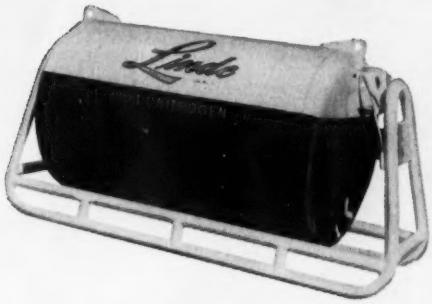
During 1959, ALCOA will conduct engineering conferences in a number of major cities on process industries applications of aluminum. Contact your nearest ALCOA sales office for full particulars and dates.

Typical chemicals stored in ALCOA tanks

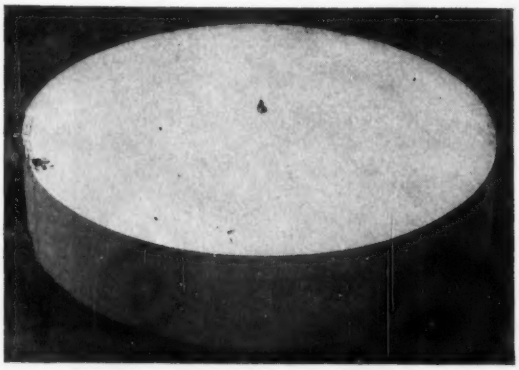
Acetaldehyde	Glycerol phosphate
Acetic acid, glacial	Lacquer
Acetic anhydride	Methyl alcohol
Acetone	Napthenic acids
Acrylic acid, glacial	Naval stores
Acrylonitrile	Nitric acid (above 82% conc.)
Adipic acid	Nylon salts
Ammonium carbonate	Oleic acid
Ammonium nitrate solutions	Phenol
Ammonium thioglycolate	Propyl alcohols
Amyl mercaptan	Propylene glycol
Animal oils	Resins
Benzene	Rosin
Butyl alcohols	Sorbitol
Cellulose acetate	Solvents
Edible oils	Stearic acid
Ethyl acetate	Sugar solutions
Ethyl alcohol	Toluene
Ethylene glycol	Trichlorobenzene
Fatty acids	Turpentine
Gasoline	Water (distilled or deionized)
Glycerine (natural & synthetic)	Waxes

These aluminum storage tanks maintain the purity of steam condensate for a large public utility.

Fatty acids are not discolored by contact with aluminum.



Aluminum's light weight assures easy handling and storage for this 600-liter nitrogen container. The tank is fabricated from Alcoa Aluminum Alloy 5154.

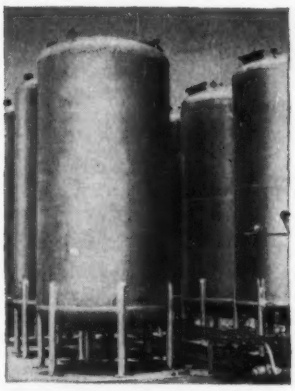


The world's largest all-aluminum tank stores 2½ million gal of ammonium nitrate at 180°F. Prime consideration here was the need for uninterrupted storage service with a minimum of maintenance. The tank stands 26 ft high, and has a diameter of 128 ft.

Typical mechanical properties of Alcoa Aluminum Alloys

Alloy and Temper	Tension			Hardness, (2)	Shear Ultimate ksi	Fatigue Endurance Limit, ksi	Modulus of Elasticity ksi
	Strength, Ultimate	ksi Yield	Elongation % in 2 in. (1)				
5052-O	28	13	25	47	18	16	10,200
5083-O	42	21	22	73	26		10,300
5086-O	38	17	22	65	23		10,300
5154-O	35	17	27	60	22	17	10,200
5454-O	36	17	22	62	23		10,200
5456-O	45	23	24	75	28		10,300

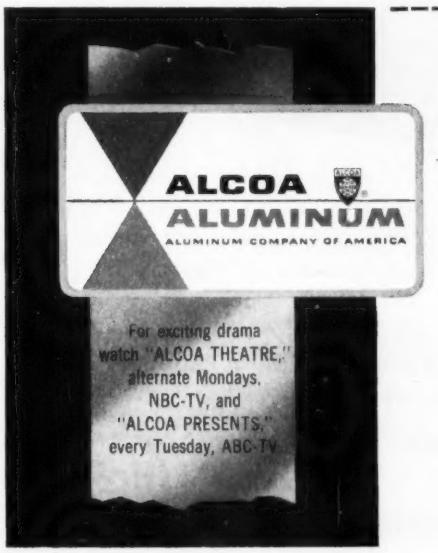
(1) 1/16-in. thick specimen
(2) Brinell; 500-kg load, 10-mm ball



ASME design stress values for various Alcoa Aluminum Alloys (psi at 100 degrees F)

5052..... 6,250 psi
5083.....10,000 psi
5086..... 8,700 psi
5154..... 7,350 psi
5456.....10,500 psi

Alcoa standard tanks are constructed of stock components and are available for fast delivery. They provide the safest storage for a wide variety of chemicals, petrochemicals and petroleum products.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- ☐ 10460 Process Industries Applications of Alcoa Aluminum
- ☐ 10508 Cleaning and Maintenance
- ☐ 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres
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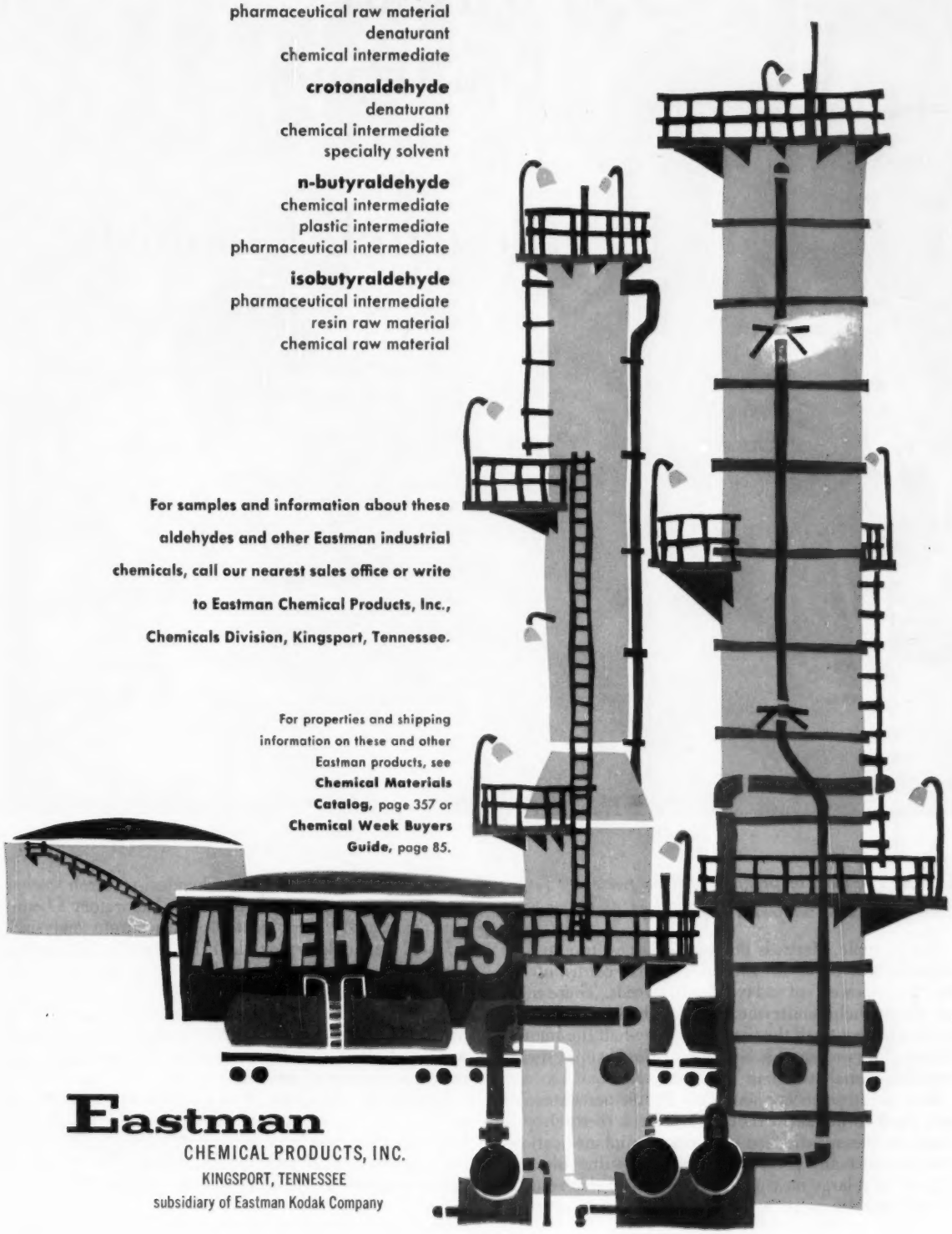
For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog**, page 357 or **Chemical Week Buyers Guide**, page 85.



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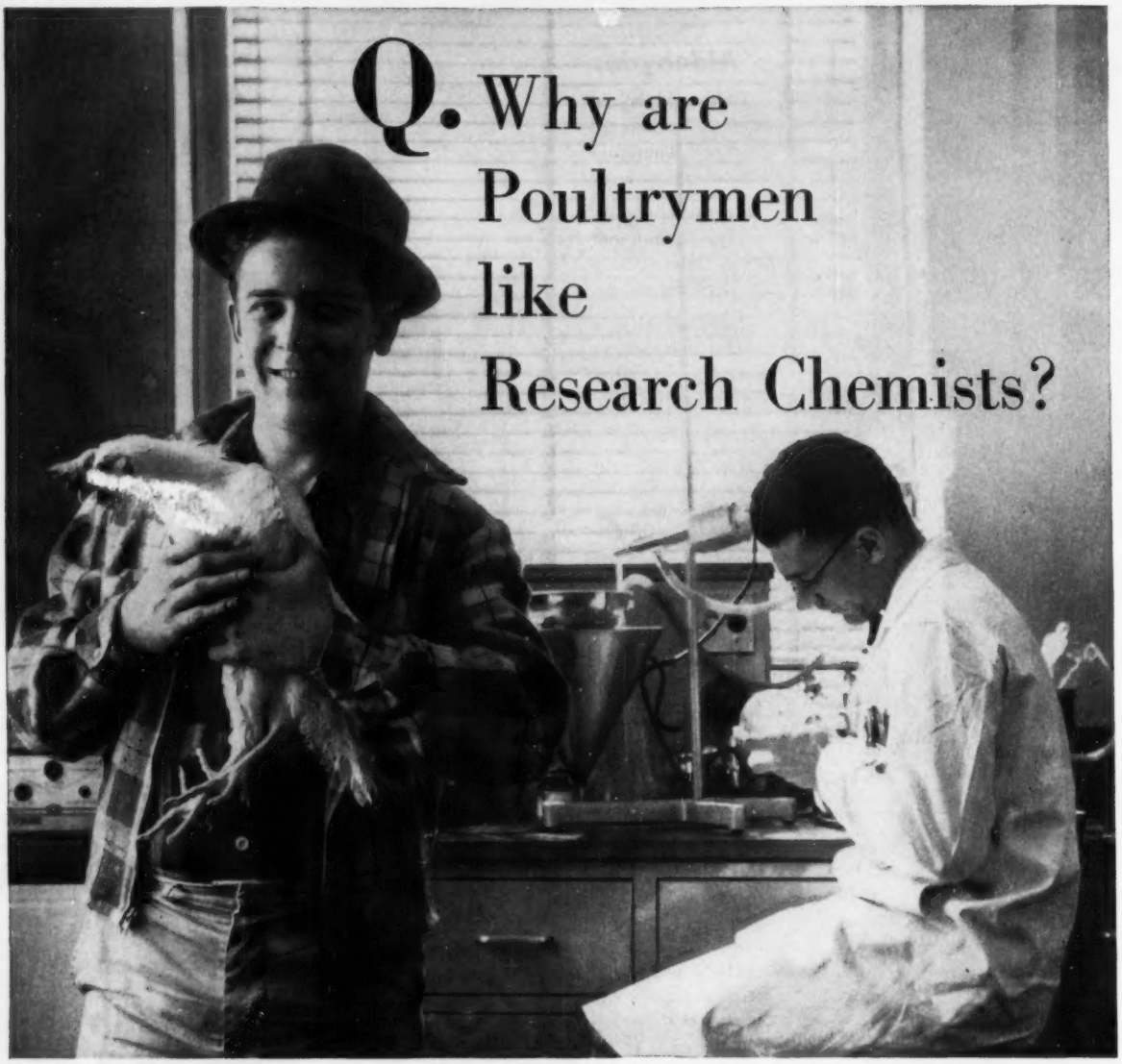
Q. Why are Poultrymen like Research Chemists?



A. *The tools of progress in both fields are forged from products developed and produced by Merck.*

For example, Merck is the world's largest producer of vitamins and other micronutrients that contribute to the "grow-power" of today's poultry feeds. These modern rations help poultrymen to raise the highest-quality broilers in about half the time and on one-half the amount of feed than was possible before nutritional supplements were discovered.

Too, poultrymen are sending a higher percentage of each flock to market. Products of Merck research—resulting in therapeutic feed supplements and medications that control many previously rampant poultry diseases—have, in a large measure, contributed to this result.

Equally impressive—to the chemical research worker—are the many hundreds of Merck Laboratory Chemicals designated "precision tools for accurate analysis."

Noted particularly for their high-quality standards, many Merck reagents and solvents are actually purer than required by the standards of the American Chemical Society. Because of their outstanding dependability Merck laboratory chemicals are invaluable in analytical work, and play a vital role in some of the most important research projects of our time.

Laboratory chemicals, feed supplements and animal medications are representative of Merck products that help speed progress in nearly every field served by chemistry. For technical information bulletins on the products mentioned above write to Department CW-3.

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POWELL
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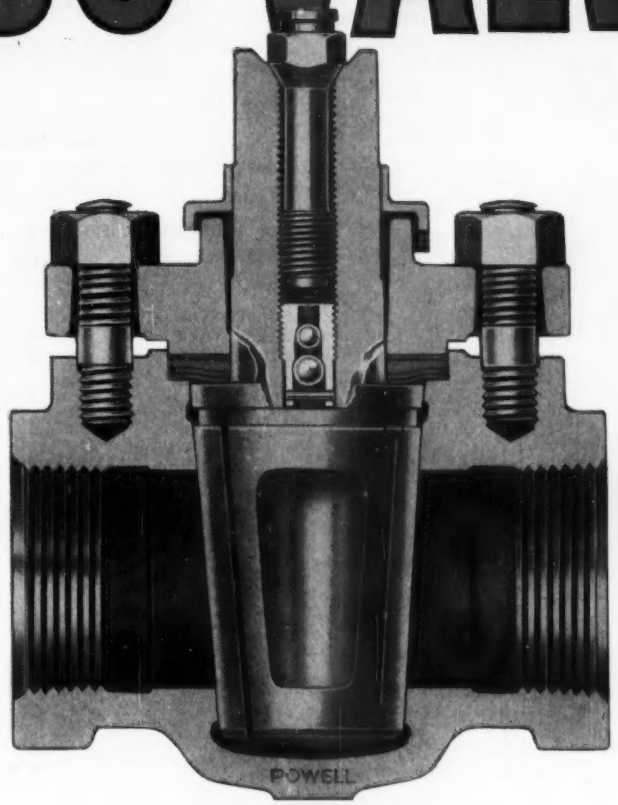

Sectional-Powell Lubricated Plug Valves, Single Gland type. Also available with Flanged Ends.

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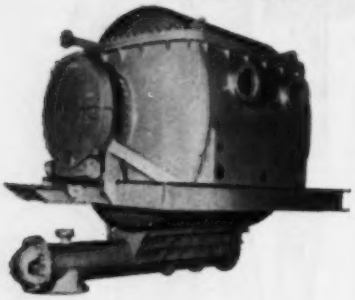

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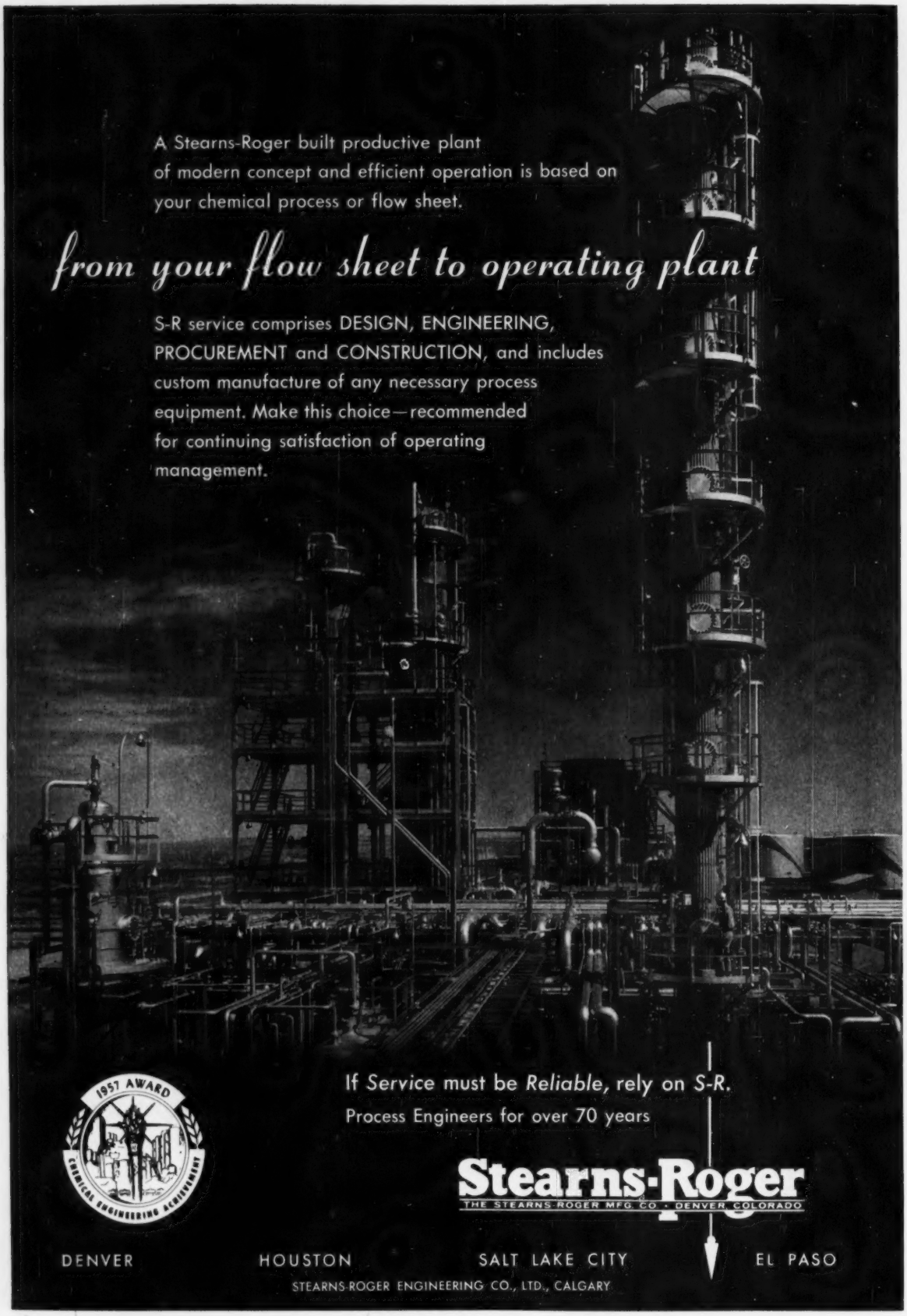
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Business Newsletter

CHEMICAL WEEK
April 18, 1959

Early returns on first-quarter business—all brimming with optimism—help to explain why chemical companies have decided to beef up their capital investment programs (*see also p. 36*).

Allied Chemical jubilantly tells of record first-quarter sales: $169.1 million, up 14% from the corresponding period in '58. Net income of $11.4 million is up 68% from last year, and 14% better than in the opening period of '57.

Celanese says first-quarter sales are up 20.3%, to $58.9 million, with all divisions—chemicals, plastics and textiles—contributing to the rise. Earnings rocketed to 64¢, from 23¢/share in last year's dismal first quarter. And in line with the industry's new growth trend, Celanese is mapping a sharp rise in capital expenditures this year. The '59 outlay is now expected to hit $15 million, compared with last year's $8.2 million.

Hooker Chemical—reporting on the three months ended Feb. 28—also notes a 20.3% gain in sales; the first-quarter total is $34.9 million. Net earnings are up 26.4%, to $3.2 million. And Hooker, too, is thinking about growth: looking forward to "a continuing good level of operation for the remainder of the year, with optimistic long-range forecasts for future expansion," Hooker management is setting up a "forward planning committee" for recommending and implementing the attainment of long-range goals.

Du Pont told its shareholders in their annual meeting this week that first-quarter sales mounted 22% from the comparable period last year. The figure: $506 million, highest in the company's 156-year history. Earnings were expected to be up about 70% from last year and slightly higher than in first-quarter '57. Total '59 sales may hit an all-time high; but construction outlays this year will be down to $180 million, compared with $230 million in '58.

Beryllium Corp. sales climbed nearly 50%, to $4.95 million, and net income staged a nearly 10-fold jump, to $350,399. President Walter Lowry expects this year's sales to total close to $20 million, with profits topping $1.4 million.

Pharmaceutical firms, too, chalked up first-quarter sales gains, but average profits were slightly under last year's highs.

Abbott Laboratories President George Cain pegged sales at $33 million, slightly higher than last year. Earnings were $1.16/share—"down a few cents because of increased operating expenses." Cain predicted total '59 sales of $121 million, earnings of $3.35/share—both slightly higher than '58 totals.

Eli Lilly's first-quarter sales hit $48.1 million vs. $45.2 million in '58. Estimated net is $7 million, compared with $6.4 million a year ago.

And Parke, Davis President Harry Loynd told shareholders last week that first-quarter sales are up, though "profits will be off slightly." Predicting a strong pickup in the latter half of the year, Loynd said year-end sales and earnings should be 10% and 5% higher than comparable '58 figures.

•

In boosting their capital spending program this year, chemical companies are changing the geographical growth patterns. The Middle Atlantic states will be getting a larger share of this year's outlays—25%, compared with only 16% last year—and the Southern states' portion is being sliced from 35% last year to 25% in '59.

CPI companies in Canada, however, are cutting down on their capital expenditures this year. According to a survey by the Bank of Montreal, makers of chemicals and allied products will invest $109.5 million in '59, a decrease of 11.2% from their '58 capital budgets. Pulp and paper companies are planning to spend $119.7 million, an 8.7% drop; and outlays for the "products of petroleum and coal" industry will be down 11%, to $132.9 million.

•

Add two chemical expansions in Texas. A group of investors has formed the Solid Nitrogen Co. and plans to put up an ammonia-urea plant at Freeport. Cost would be in the $10-million range. And a petroleum company is getting ready to erect a 100-tons/day spent sulfuric acid recovery plant at El Paso. Chemical Construction Co. will probably build both plants.

•

Metal & Thermit is putting fresh emphasis on chemicals. President H. E. Martin reports M&T has new development contracts with B. F. Goodrich, Mobay, Dow and Permachem for use of its organics. It has also started production of additives for lubricants used in military jet planes.

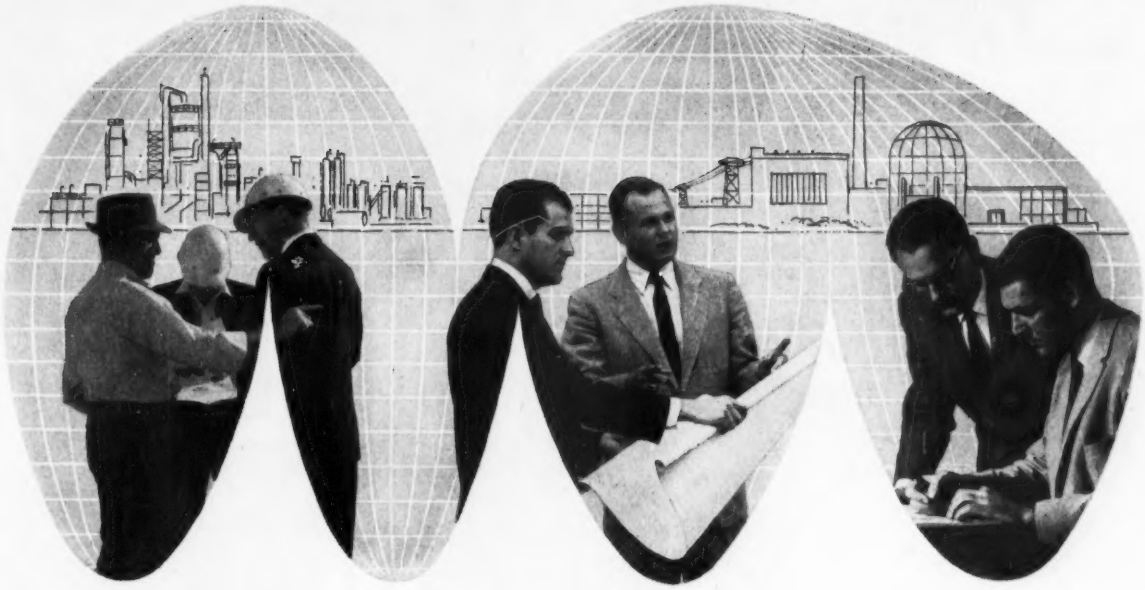
First-quarter sales, says Martin, will be about $9.75 million; earnings, 27¢/share. Forecasts for '59 put year-end earnings in the neighborhood of $1.50/share, compared with $1.12 in '58.

•

Chicago this week is the scene of the national packaging exposition and probably the biggest local observance of Chemical Progress Week in the U. S. A CPW luncheon there on Monday drew nearly 200 company executives.

Polythylene is in the spotlight at the packaging exposition. Lever Bros. and Procter & Gamble are test-marketing products in blow-molded, high-density polyethylene containers; and Chase Bag and Bemis Bag are planning to make polyethylene shipping sacks. Polyethylene film consumption will likely grow from 200 million lbs./year in '58 to 400 million lbs./year by '64, say packaging men.

fifth in a series



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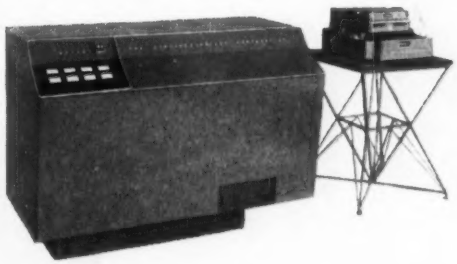

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Some of the world's largest companies have purchased the RW-300 Digital Control Computer for uses ranging from the completely automatic control of an oil refinery unit in Texas to the monitoring of a nuclear reactor in France. Additional RW-300 installations are under way in such fields as chemical manufacturing, cement making, air traffic control, equipment testing, and data reduction.

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For further information, call or write: Director of Marketing, The Thompson-Ramo-Wooldridge Products Company, P. O. Box 90067 Airport Station, Los Angeles 45, California, OSborne 5-4601.

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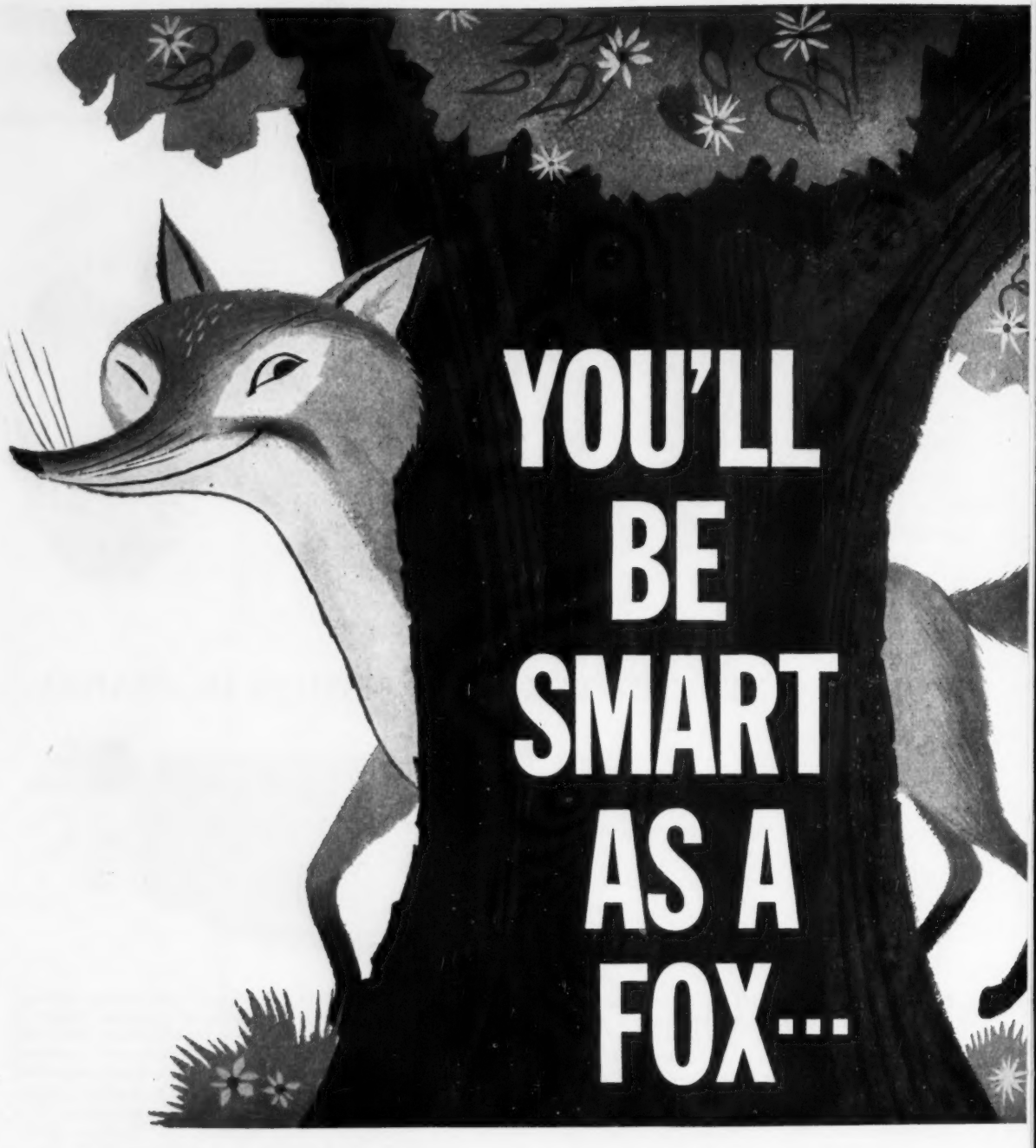

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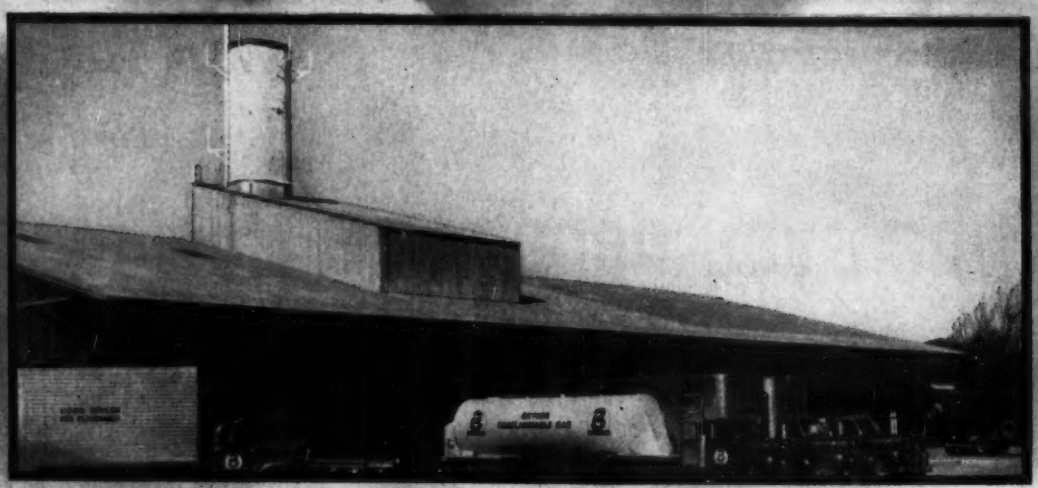
HOW IT WORKED OUT

Now that the Messer plant is "on stream" in Fort Worth, what are the results? To quote Mr. C. K. Rickel, Big Three president:



EXCEEDS CAPACITY—Big Three plant at Fort Worth runs above capacity whenever necessary; works efficiently and economically.

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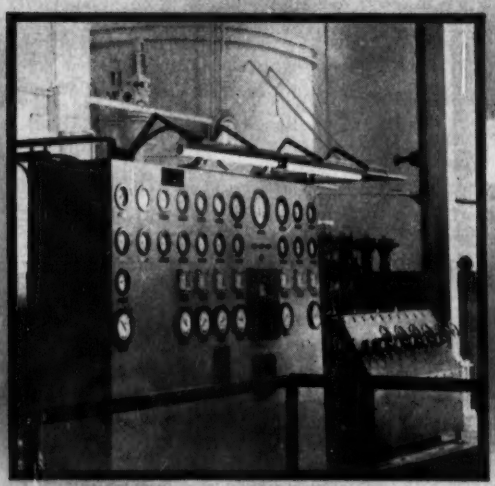
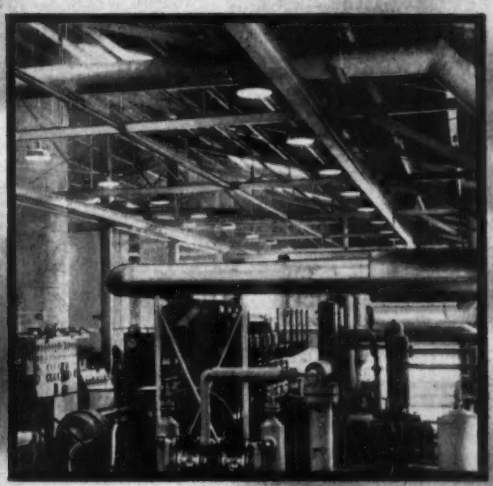


ONE OPERATOR PER SHIFT—Extensive use of automatic controls in Big Three unit requires little attention —only one operator.



REAL POWER ECONOMY—Power for this installation is furnished by an inexpensive natural gas engine—yields products at low cost.

VIEWPOINT — OPINION

A PLAINTIVE NOTE appears as a footnote in each of the last four annual reports of a certain chemical producer. We quote the '58 report:

"The Internal Revenue Service and the company have disagreed as to the method of computing percentage depletion. The method proposed by the service, if applied to 1954 and subsequent years, would give rise to income tax liabilities substantially in excess of the provision made in the accounts . . ."

Percentage depletion for the extractive industries is comparable to depreciation on capital property. Depending on the mineral involved, 5 to 27.5% of the gross selling price of the first marketable product can be deducted before computing income taxes.

But for chemical firms that mine their own raw materials, this is now a wild and woolly no-man's land. The courts, in ruling on the provisions of the '39 Internal Revenue Code, have allowed companies that mine limestone and clay to figure depletion using the selling price of cement and fire brick, loaded in railroad cars. But, despite this ruling, the Treasury has tried to hold all other mineral producers to a more restricted depletion basis. (Nonetheless, courts have continued to make headway: cinnabar miners could base depletion on the price of quicksilver in flasks, rather than on the price of cinnabar ore; talc producers can base it on price of fabricated pencil crayons—including packaging costs.

In '54, Congress changed the law slightly; but tentative regulations for this law have since been withdrawn. And now the Treasury proposes a new law that, hopefully, could better define the value of a mineral on which depletion should be reckoned. But many mineral producers feel this is unworkable.

While the subject is complex, we stress the need for action. It's manifestly unfair to make companies and their stockholders face such continuing uncertainties year after year.

H. C. Johnson

Editor-in-Chief

Size vs. Efficiency

TO THE EDITOR: Re the article on merger of two flavor producers (*CW, March 14, p. 79*), I would like to point out a basic omission . . .

One important characteristic of the flavor-fragrance business that has placed a limitation on the advantages of bigness is the predominance of small-volume production of most flavor-perfume chemicals.

In fact, contrary to the advantages of bigness, Du Pont, U.S. Rubber Co. and Dow Chemical Co. have all sold their flavor-fragrance business to much smaller firms.

Some 2,000-3,000 different chemicals and derivatives are used regularly by this industry, but in most cases their production amounts to only a few thousand pounds per year. Also, the introduction of new chemicals into this industry requires decades, during which time an annual production of 1,000 lbs. is frequently the norm. The big chemical company type of cost accounting on small-volume production results in very high prices and occasionally in discontinuing manufacture. This naturally permits many other small companies, including ourselves, to render a useful function.

R. PANTALEONI
President
Alpine Aromatics, Inc.
Metuchen, N. J.

Imports—Another View

TO THE EDITOR: . . . We must agree with the purchasing agents' conclusions about buying imported chemicals, as outlined in your article "Purchasing Men Spot '59 Buying Shifts" (*CW, Jan. 31, p. 65; see also a previous comment, CW, Feb. 28, p. 11*—ED.).

In over 25 years as importers, we have heard strong arguments against the purchase of imported commodities. Those who buy from unproved sources have experienced failure—or, at least, disappointment—in connection with foreign suppliers' delivery, quality and integrity. Foreign suppliers, like domestic ones, can be either good or bad.

When offering our materials, we include the entire background of the foreign supplier. This, together with follow-up visits of factory detail men, ultimately convinces customers of the reliability and determination of foreign suppliers.

We feel that, on a percentage basis, more domestic suppliers can be found wanting. . . .

M. A. MIDDLEMAN
Conray Products Co.
New York

No Rivets in Tulsa

TO THE EDITOR: CHEMICAL WEEK is the easiest business publication to read, and I wanted you to know that this reader enjoys the terse reports on complex subjects.

I would like to kid you, however, about your illustration for "Plastics Vie for the Boat Buyer's Budget" (*CW, Feb. 14, p. 75*). It appears that your rivets are showing. The flat surfaces of the boat look old-fashioned to us Oklahomans who are used to seeing beautifully curved plastic boats. It is obviously aluminum, which appears only in a few boats at our Tulsa Boat Show.

JOE ROBERTSON
2096 Osage
Bartlesville, Okla.

CW thanks Bartlesville Boatsman Robertson for his kind words. Our caption specifically stated that the deck of the boat in the picture was made of plastic. But we are happy to know that the general level of rivetlessness of the Tulsa Boat Show is on a par with that at the New York Boat Show.
—ED.

Logical Combination

TO THE EDITOR: [Re] the article "Proposing Research-Engineering Wedding" (*CW, Jan. 24, p. 67*), we believe that the establishment of parallel ladders of advancement for scientific and administrative personnel

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

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offers a solution of what has been a serious problem in technical and scientific organizations in the past.

We concur also that the integration of engineering and research functions is a logical organizational move that results in a more effective team effort. We have found that our research people are gaining better understanding of the problems with which the engineering people are faced and that the engineers are better informed on problems that confront the research people very early in a project.

I believe your article will help to stimulate the consideration of more reorganization along these lines by other companies.

C. H. THAYER
Sun Oil Co.
Philadelphia

MEETINGS

American Society of Perfumers, fifth annual open symposium, Essex House, New York, April 20.

American Oil Chemists Society, 50th anniversary meeting, Roosevelt Hotel, New Orleans, April 20-22.

Lead Industries Assn., 31st annual meeting, Drake Hotel, Chicago, April 22-23.

Southwestern Paint Convention; theme: New Products, New Markets—Through Creative Technology; Shamrock Hilton Hotel, Houston, Tex., April 23-25.

Scientific Apparatus Makers Assn., 41st annual meeting, Greenbrier, White Sulphur Springs, W. Va., April 25-30.

1951 Industrial Health Conference, Sherman Hotel, Chicago, April 25-May 1.

Chamber of Commerce of the United States, 47th annual meeting, Washington, D.C., April 26-29.

The Metallurgical Society, American Institute of Mining, Metallurgical and Petroleum Engineers, international symposium on physical chemistry of process metallurgy, Penn-Sheraton Hotel, Pittsburgh, April 27-May 1.

Assn. of Consulting Chemists and Chemical Engineers, symposium and banquet; theme: Industrial and Educational Developments in the Soviet Union; Shelburne Hotel, New York, April 28.

American Society of Mechanical Engineers, first national metals engineering conference, Sheraton-Ten Eyck Hotel, Albany, N. Y., April 29-May 1.

The Fiber Society, spring meeting, Fontana Village, N. C., April 29-30.

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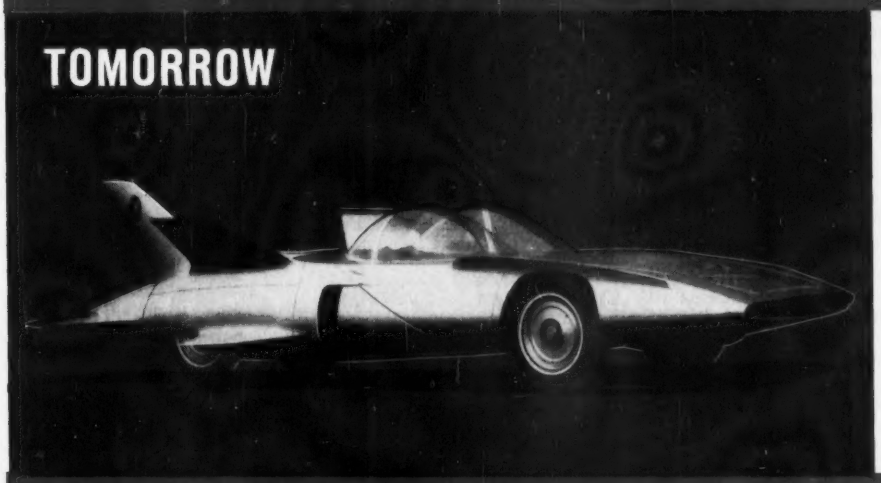

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In Industry after Industry..."ESSO RESEARCH works wonders with oil"

"If this is the only way we can keep our product uniform, we'd better switch to a fatty acid!"

More and more manufacturers are finding that fatty acids have important advantages over natural fats and oils for making a host of products: soaps and surfactants . . . textile finishes . . . cosmetics and toiletries . . . paints and plastics . . . lubricants . . . and numerous intermediates.

Although natural fats and oils may appear inexpensive on a raw material cost basis, the use of fatty acids can save a great deal of money . . . in equipment, in processing and in man-hours. Type for type, as compared to natural fats and oils, fatty acids are more reactive and permit faster and more complete saponification, esterification or other reactions.

Fatty acids are products of known composition and predictable behavior. They give maximum flexibility in the choice and ratio of fatty constituents. They have improved stability, because factors responsible for rancidity and decomposition have been removed.

Hidden Processing Costs Rule Out Fats and Oils. In the industrial soap field and in toiletries, the decision to saponify a fat or the corresponding acid may be an economic one, but many hidden costs of starting with the fat are frequently overlooked. The fatty acid yields savings in steam and labor, gives greater output per unit of equipment cost. It gives assurance of a uniformly good product, with the proper viscosity, odor and color characteristics. Greater flexibility in choosing fatty composition is possible, and products can be adapted to changing demands.

Controlled Composition Insures Product Acceptance. In many industries, fatty acids offer definite quality control advantages over fats and oils. For example, triple-pressed stearic acids like Groco 55L are produced with closely balanced physical and chemical properties which make these fatty acids invaluable in precise reactions. A case in point is esterification procedures. Such precision would be impossible with a natural fat.

Fast Reactions Make Equipment More Productive. In lube grease manufacture, fatty acids or their metallic soaps permit closer control and faster reaction during saponification than do fats and oils. Plant equipment can be used more productively. Better end products are possible. The use of oleic acids such as Groco 4, for example, with closely controlled titre, has done much to assure greases of uniform lubricating and bodying characteristics, greases which will not separate during long storage under extreme temperatures.

For more information on specification fatty acids for your consideration, send for the brochure "Fatty Acids in Modern Industry."

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ARE YOU STILL SHIPPING THESE PRODUCTS IN DRUMS?

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- Ammonium chloride
- Ammonium nitrate
- Ammonium nitrate (fertilizer grade)
- Ammonium phosphate
- Ammonium sulfate
- Ammonium sulfate-nitrate
- Barium chloride
- Barium chromate
- Borax
- Boric Acid

- ☑ Calcium chloride
- Calcium cyanamid
- Calcium phosphate
- Casein (dry)
- Caustic Soda Flake
- Cellulose acetate
- Cement (specialties)
- Coconuts (shredded)
- Dishwashing compounds
- Disodium phosphate

- ☑ Glues & pastes (vegetable dry)
- Insecticides
- Magnesium oxide
- Magnesium sulfate
- Meat scraps
- Milk, dried & powdered
- Monosodium glutamate

- ☑ Nylon monomer
- Potassium aluminum sulfate (alum)
- Polyvinyl Acetate
- Polyvinyl Chloride
- Potassium bichromate
- Potassium carbonate
- Potassium chloride
- Potassium magnesium sulfate (alum)
- Potassium nitrate
- Potassium sulfate
- Rice

- ☑ Salt
- Sodium bicarbonate
- Sodium bichromate
- Sodium bisulfate (nitre cake)
- Sodium orthosilicate
- Sodium phosphates
- Sugar
- Sodium resinate
- Sodium silicate
- Sodium sulfide
- Sodium thiosulfate
- Sodium hyposulfite
- Super phosphate (fertilizer)

- ☑ Tetro sodium pyrophosphate
- Trimethylolpropane
- Trisodium phosphate
- Urea

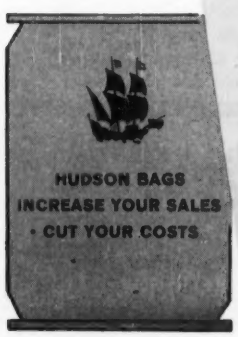
NOW YOU CAN SHIP and SAVE with HUDSON MULTIWALL BAGS and the NEW HUDSON MVT SEALER

Hudson has a number of barrier sheets—foil wall, cold-proof AL, Moisbar, PE coated—which, singly or in combination, can positively safeguard a wide variety of sensitive products.

A new Hudson development, the MVT Sealer, now applies the same degree of protection for the ends as is available for the side walls. This solves the last remaining problem of Multiwall packing for such products as listed at left.

Savings for you and your customers can be extremely high. Get the full facts. Send for information today.

The MVT Sealer is also valuable to packers already using Multiwalls. The Hudson MVT Seal is far better and usually cheaper than wax-dipped ends.



HUDSON MULTIWALLS

HUDSON PULP & PAPER CORP.
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Plants at Pine Bluff, Ark. • Palatka, Fla. • Wellsburg, W. Va.

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477 Madison Avenue, New York 22, N. Y.
Gentlemen:
Please send me full information on "How I Can Save and Package with MVT Multiwall Bags" and details of the Hudson MVT Sealing Machine.

My Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____

Using Salt Efficiently

by INTERNATIONAL SALT COMPANY, INC.

How Flow Characteristics of Salt Affect Storage and Feeding Designs

If you're planning to install new salt-storage and brine-making facilities or enlarge existing ones—or if you'd like to make your present setup more efficient—here's information that can help you.

Referring to the table, you will note that most sizes of Sterling Rock Salt commonly used to make brine have an angle of repose of 32° from the horizontal. But the angle of slide for salt on chute materials differs according to salt size and the material used. This angle ranges from 20° for smooth glass, plastic or highly polished steel to 54° for sawed wood or rough concrete.

These two principles of salt flow influence brine-making installations in three distinct ways: in storage-bin design, in computing the minimum slope for salt-feeding chutes, and in determining the proper clearance between chute opening and the salt dissolver.

1. Storage-bin design. It is sometimes thought that a salt-storage bin placed above a dissolver should incorporate a sloping hopper, so that salt will flow out freely through the opening in the bottom. This extra expense in bin construction, however, may not be necessary. The angle of repose guarantees that salt, as it pours through the discharge opening in a flat-bottomed bin, will form its own sloping bottom. What's more, the salt that doesn't flow out on its angle of repose will remain in dead storage for use in emergencies.

2. Slope of feed chutes. In some plants, local conditions make it impractical for an overhead storage bin to be exactly above the dissolver. No matter. Rock salt's varying angles of slide permit continuous salt flow in *sloping* chutes. Though a standard 45° slope is recommended because of its built-in insurance against clogged chutes, flatter slopes are possible with certain chute materials. See table.

3. Chute-to-dissolver clearance. The constant 32° angle of repose for the larger sizes makes it possible to determine just how much clearance there should be between chute opening and dissolver, to insure a full dissolver at all times. Your Sterling representative can supply data for different chute and dissolver diameters.

SIZES OF STERLING ROCK SALT	NO. 2	NO. 1	CC, A, C	FC
ANGLE OF REPOSE Salt on Salt	32° ± 2°	32° ± 2°	32° ± 2°	47° ± 6°
ANGLE OF SLIDE Glass; Smooth Plastic; Highly Polished Stainless Steel	20° ± 2°	21° ± 2°	21° ± 2°	30° ± 6°
Carbon Steel with Smooth Mill Scale; Medium-Polished Stainless Steel; Monel Metal	28° ± 2°	29° ± 2°	29° ± 2°	37° ± 3°
Carbon Steel (Heavily Rutted and Pitted); Smooth-Planed Wood; Smooth Concrete	29° ± 2°	31° ± 2°	33° ± 2°	44° ± 3°
Rough-Sawed Wood; Rough Concrete	38° ± 2°	41° ± 2°	41° ± 2°	54° ± 6°

Table gives Angle of Repose of salt on salt and Angle of Slide on various surfaces for several crystal sizes of Sterling Rock Salt.

Further data on rock salt characteristics is contained in a free booklet, "Brine for Today's Industry." This comprehensive booklet also has valuable technical information on many aspects of storing, handling or using salt. Send today for your free copy.

50 years of salt experience can benefit your company. From 50 years' field experience and a continuing research and development program (the first ever established in the salt industry), International has accumulated an unequaled amount of technical data on salt—its production, properties and uses. Our engineers will be glad to make this information available to you without charge. They can also help you select the right salt for your needs—from the complete line of premium-quality Sterling Rock and Evaporated Salt. Contact your nearest International Salt Company sales office, or write to us direct.

International Salt Company, Inc., Scranton 2, Pennsylvania • Sales Offices:

Atlanta, Ga.	Chicago, Ill.	Memphis, Tenn.	Philadelphia, Pa.
Baltimore, Md.	Cincinnati, O.	Newark, N. J.	Pittsburgh, Pa.
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Buffalo, N. Y.	Detroit, Mich.	New York, N. Y.	St. Louis, Mo.

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INTERNATIONAL SALT COMPANY, INC.

"YES SIR, SOUTHERN STATES MET THAT TIGHT DELIVERY SCHEDULE. HERE ARE THE DRUMS, RIGHT ON TIME."

Meeting exacting specifications and delivery schedules is routine operation at Southern States. In the modern Birmingham plant orders large and small are turned out daily to meet customers' requirements.

Many companies in the process industries have proved the quality of these metal containers through both storage and shipping. All types of high-bake phenolic linings, as well as other types, are applied to meet any and every specification. Deliveries are tailored to meet the customers' most exacting production schedules.

You can't beat Southern States for prompt, accurate deliveries of quality-assured heavy and light gauge steel drums. You can put your plant on schedule at any time by working with the Southern States Containers' people. If you would like to have complete details, we shall be glad to supply them. There will be no obligation.

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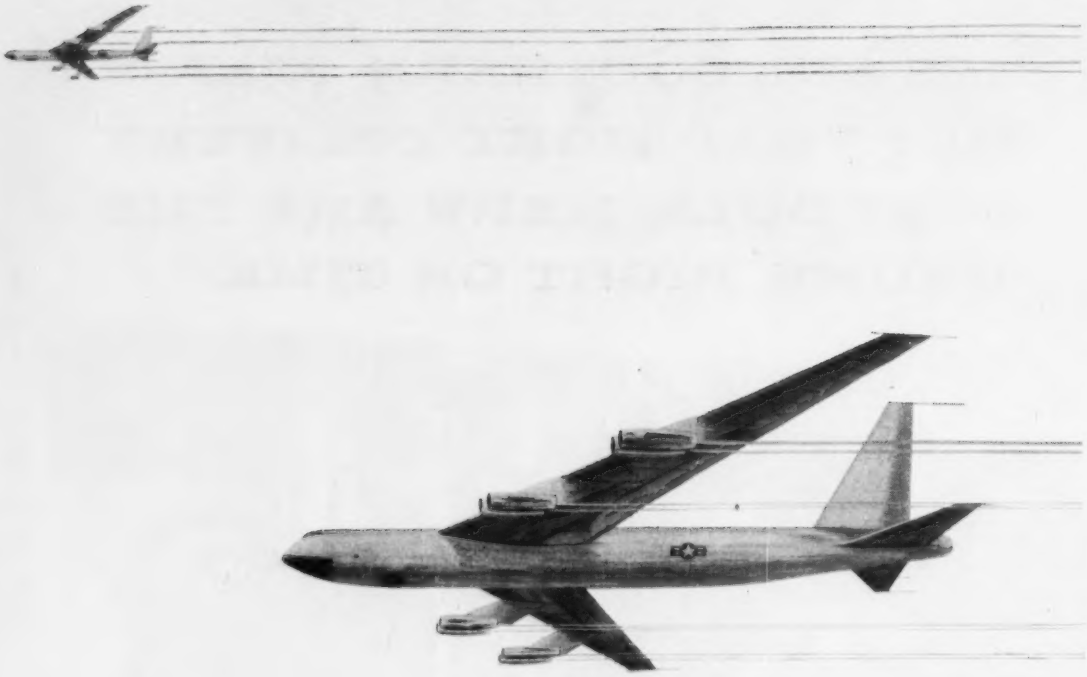

she floats so jets can fly!

GATCO-200 . . . a new 230'x 43'x 15' oil barge built by INGALLS at its Decatur, Alabama Yard for Gulf Atlantic Towing Corporation of Jacksonville, will carry jet fuel for the armed forces. It is scheduled for coastwise service . . . has INGALLS exclusive patented bow, which reduces towing resistance, plus skegs to improve towing characteristics in coastal waters. It has a capacity of 20,000 barrels . . . is equipped with anchor and anchor-handling equipment and two Diesel-engine-driven pumps for unloading cargo. The GATCO-200 is further proof of INGALLS' ability to build the right barge for the right job at the right price. *On your next barge job, large or small, check with* INGALLS!

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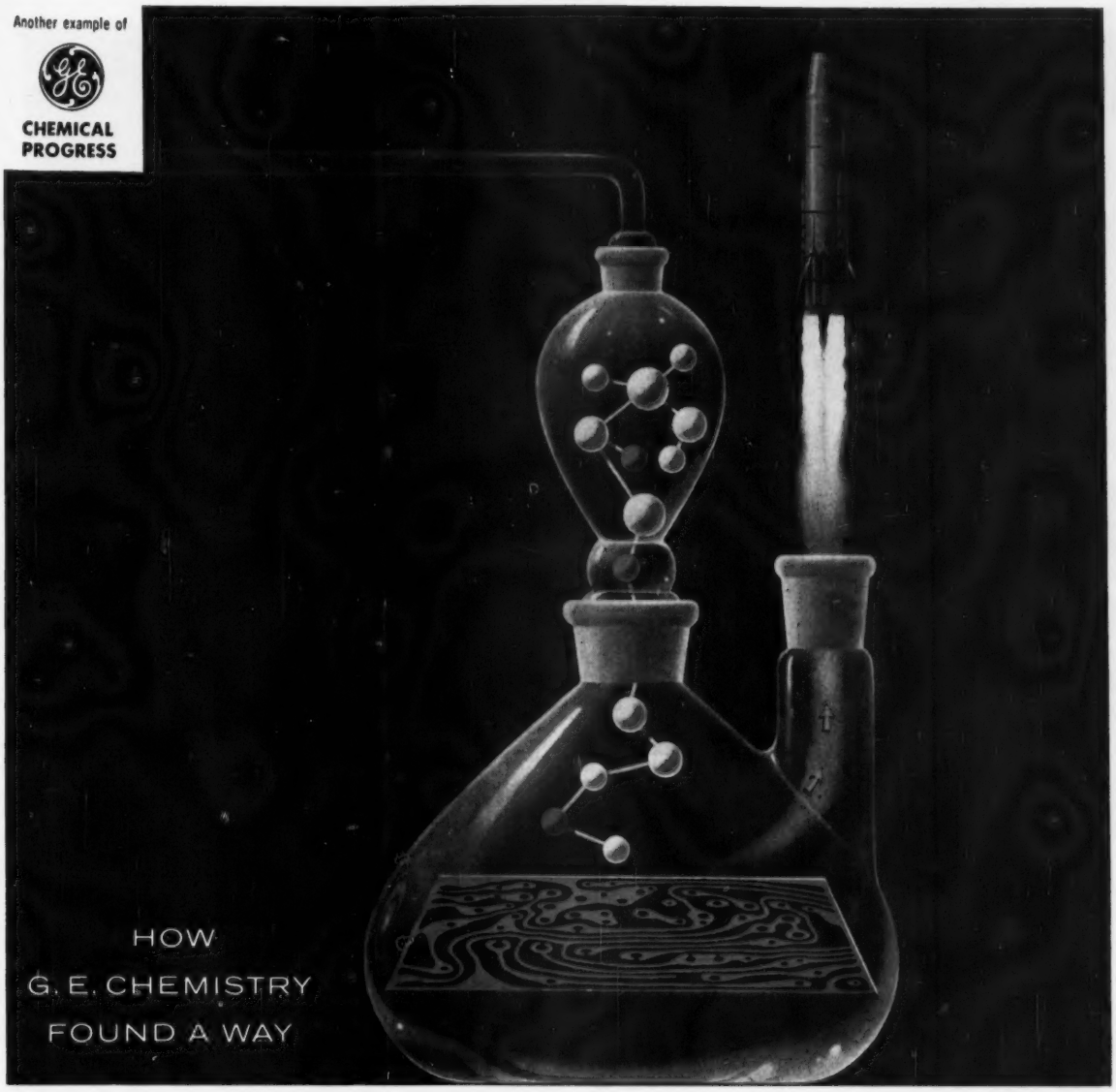
Executive Offices: Birmingham, Alabama / Shipyards: Decatur, Alabama • Pascagoula, Mississippi (Two yards on the Gulf)

Another example of

CHEMICAL PROGRESS



TO GIVE ATLAS A TROUBLE-FREE NERVOUS SYSTEM

When the four-and-a-half ton ATLAS missile was launched last December, it became the largest man-made object ever put into orbit. Much of the credit for getting it up there goes to the missile's electronic nervous system – its incredibly accurate guidance equipment.

To insulate and support this intricate circuitry, missilemen needed printed circuit boards that could stand up to the harsh requirements of a space vehicle...and do it with absolute, unfailing reliability. After exhaustive testing, they picked G.E. 11558 Textolite® laminate, a copper-clad epoxy-glass circuit board.

These laminates met some tough specifications: You can dip them in molten solder at 500° F. They won't blister. Immerse them in concentrated nitric acid and they still won't loosen their copper bond.

The special properties of this and other Textolite laminates were developed through extensive chemical research by General Electric. This continuing program of chemical investigation makes it possible for G.E. to produce new and improved materials for industry and national defense.

If you'd like to know more about G.E. Textolite products, write Dept. LPD, CHEMICAL AND METALLURGICAL DIVISION, General Electric Company, Coshocton, Ohio.

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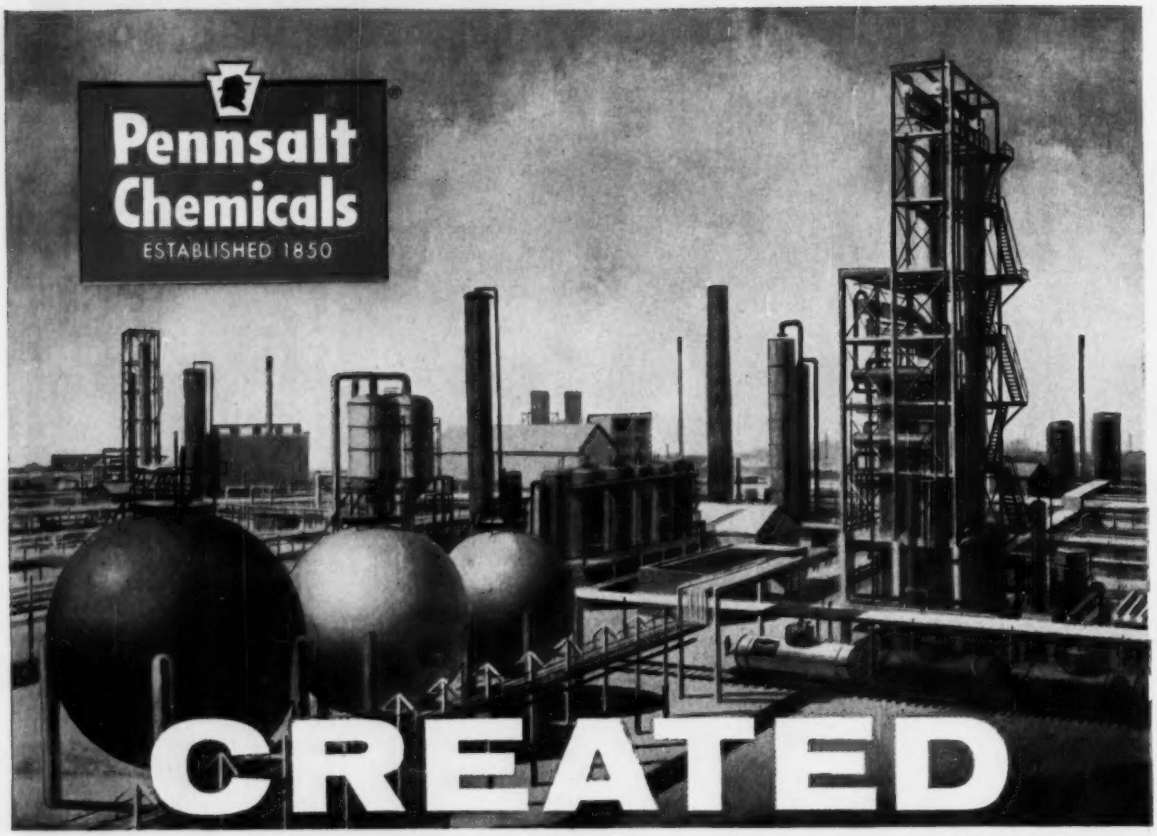
Silicone Fluids, Emulsions, Resins, Rubbers • Phenolic Molding Powders, Foundry Resins, Industrial Resins • Fused Magnesium Oxide • METHYLON® Coating Intermediates • LEXAN® Polycarbonate Resins • Mica Products, Varnished Cloths and Papers, Electrical Insulating Paints, Varnishes, Permafils, Wire Enamels, IRRATHENE® Insulation • TEXTOLITE® Decorative and Industrial Laminates • Man-Made Diamonds • Vacuum Melted Alloys • CARBOLOY® Cutting Tools • Permanent Magnets • Wire and Cable • Conduit Products • Wiring Devices • West Coast (Anaheim, California): GLYPTAL® Alkyd Resins • Polyester Resins



in only 8 months at 10 per cent under budget

10% UNDER BUDGET—Pennsalt Chemicals Corporation's new Methylamines plant was completed by Catalytic, Engineers—Constructors, at a figure ten per cent under the original estimated cost.

AHEAD OF SCHEDULE—The Methylamines plant was completed and ready for start-up in only eight months after the start of engineering. This "On-Time" completion was in advance of the requirements of Pennsalt Chemicals Corporation.

UNDIVIDED RESPONSIBILITY—Catalytic's control and coordination of all phases of this project and close cooperation with the client were prime factors in the successful completion. This Methylamines plant again proved Catalytic's ability to render all client services "On-Time, On-Budget".

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CONSTRUCTION COMPANY

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In Canada: Catalytic Construction of Canada, Limited; Sarnia, Ontario; Toronto, Ontario; Montreal, Quebec.

Catalytic *On-Time . . . On-Budget* Services for the metallurgical, chemical, petrochemical and oil refining industries: Project Analysis; Process Development; Process Design; Economic Studies; Engineering; Procurement; Construction.

Thanks to the variety of tints of today's paints, she can enjoy toying leisurely with many before making her final selection (as annoying as it is to him).

Your choice in white pigments is involved in her decision

Yet, whichever paint she chooses, as surely as it is pigmented with titanium, it will be pigmented with TITANOX*. There are one or more types of TITANOX pigment—rutile, anatase or titanium-calcium—not only for paints, but for anything that needs white pigment . . . paper, rubber, plastics, inks, ceramics, textiles, leather, and building materials, to name some. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

TITANIUM PIGMENT CORPORATION
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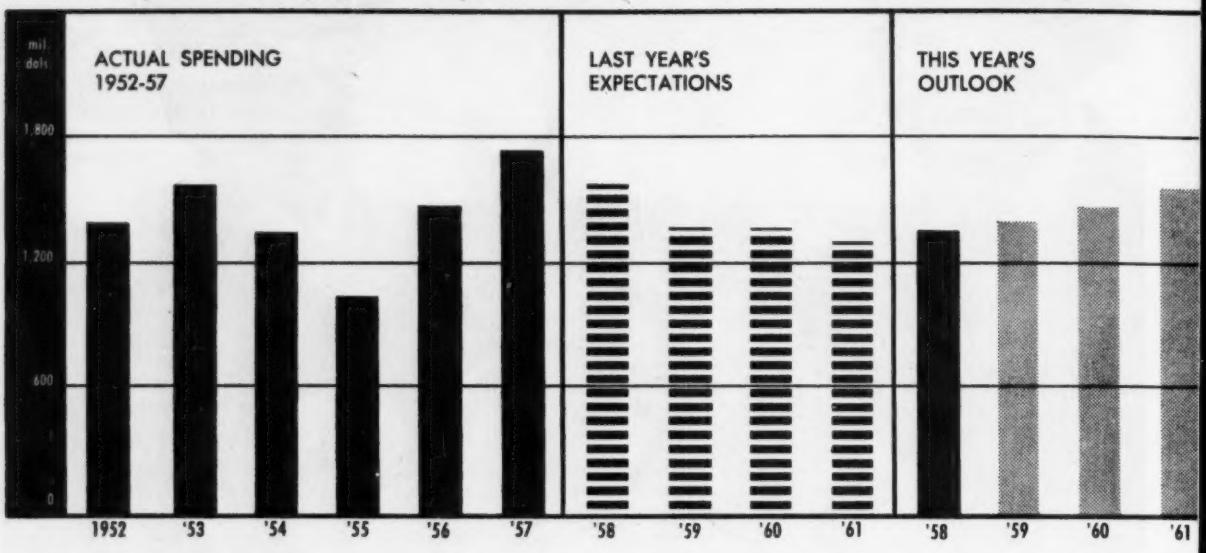
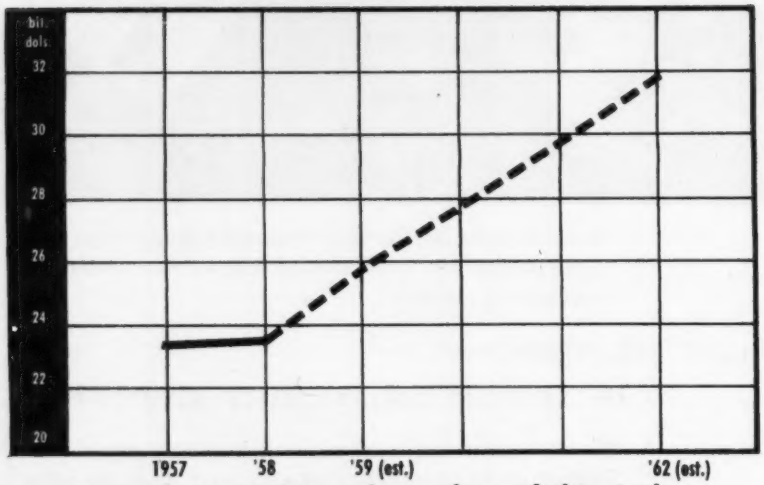
New plant and equipment expenditures by makers of chemicals and allied products.

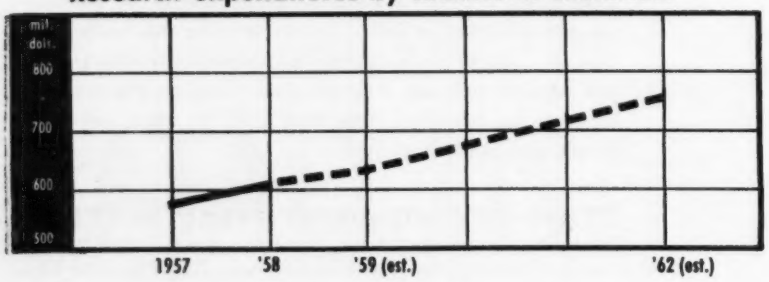


CPI Hikes Capital Spending Plans

Actual and predicted chemical sales



Research expenditures by makers of chemicals



CPI EXPANSION:

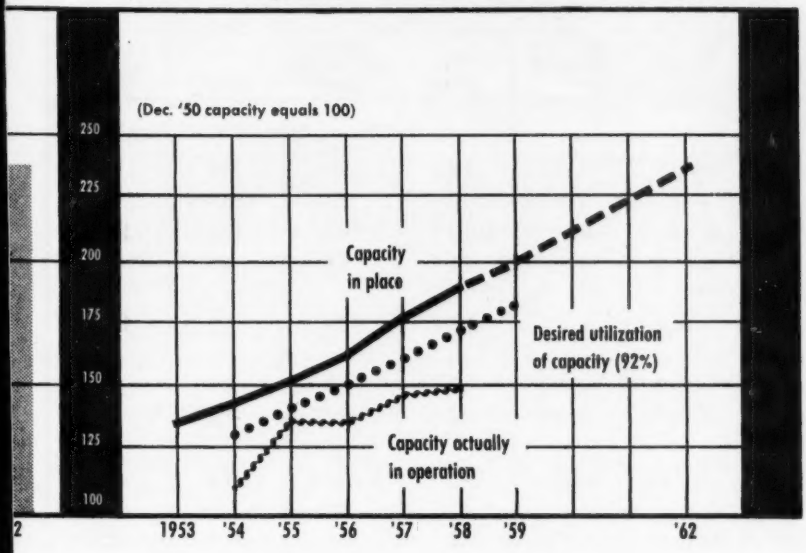
Present and projected capital

Process industries:

- Chemicals and allied products
- Paper and pulp
- Rubber
- Stone, clay and glass products
- Petroleum refining
- Nonferrous metals

All manufacturing

Index of capacity for chemicals and allied products.



as Pickup Quickens

REACHING FOR THE THROTTLE AGAIN

pending of manufacturing companies (million dollars)

Source: '59 survey by McGraw-Hill Dept. of Economics

1958	1959		1960		1961	1962
Actual	Planned as of April '58	Revised as of April '59	Planned as of April '58	Revised as of April '59	Planned as of April '59	Planned as of April '59
,320	*1,349*	1,386	*1,282*	1,441	1,542	1,635
578	*443*	636	*474*	617	611	587
134	*191*	165	*210*	188	203	223
399	*426*	498	*455*	469	478	486
665	737	698	*752*	670	750	765
510	*339*	428	*305*	368	383	394
,761	*9,138*	10,472	*9,178*	10,448	10,265	10,444

Another big wave of CPI expansion—though probably not so titanic as the tidal wave that crested in '57—is starting to roll. That's the encouraging note of the McGraw-Hill Dept. of Economics' latest survey.

That management has now reached the decision to reverse the past two years' trend of slowed growth rates can be clearly seen by comparing the '57 and '58 capital spending surveys with the latest one, out this week.

In chemicals and allied products, the about-face has come rather suddenly—within the past few months. Last year, and the year before, faced with unsettled economic conditions and with considerable overcapacity in some lines, this industry group had been pulling in its horns. Look, for example, at how plans for '58 capital spending kept dropping as management became more and more selective about proposed expansions:

Back in March '57, chemical management expected to spend $1,849 million in '58. Six months later, the forecast was down to $1,723 million; and as of March '58, the outlook was for $1,569 million. By September, this had been pared to $1,400 million; but management kept right on whittling and got actual '58 outlays down to $1,320 million.

Up to last month, the same sort of thing had been going on concerning capital spending for this year. As of April '57, it was pegged at $1,720 million, but by last fall it had been shaved to an estimated $1,288 million. Then came the fourth-quarter upswing (*see p. 38*) and continued good business in January and February. Management—tentatively, at least—has decided to take its foot off the brake and place it cautiously on the accelerator. It expanded its plans for '59 capital spending by nearly $100 million; is adding $230 million to its estimate for '60; and is raising the ante for '61 by $260 million.

In other process industries, the new trend is pretty much the same; but some managements were quicker to take action. It seems that paper companies decided last summer to step up their growth pace; and petroleum refiners made up their minds last fall.

'58 in Review: Profits Take a Trimming

Sources: Federal Trade Commission, Securities & Exchange Commission

	1958 Sales	1958 Net Earnings	1958 Cash Dividends	Percent Profit Margins			4th Qtr. 1958
	Percent Change from '57			1956	1957	1958	
Process industries:							
Chemicals and allied products	+0.5	− 9.1	+ 0.6	8.0	7.6	6.9	7.5
Basic chemicals	−4.0	−17.5	− 5.4	10.0[2]	9.5	8.2	9.6
Drugs	+5.8	+ 3.9	+16.0	10.0[2]	10.4	10.2	10.2
Other chemicals[1]	+3.5	− 1.4	+ 6.1	5.1[2]	4.9	4.7	4.6
Petroleum refining, related industries	−3.9	−14.0	+ 0.5	11.6[3]	10.3	9.2	11.0
Paper and allied products	−1.6	−11.7	− 1.9	6.2	5.0	4.5	5.0
Rubber	−0.1	− 8.1	− 0.9	4.4	4.2	3.9	4.5
Primary nonferrous metals	−7.6	−32.8	−18.1	9.2	6.6	4.8	5.8
Stone, clay and glass products	−3.0	−10.2	+ 1.4	8.2	7.5	7.0	8.9
ALL MANUFACTURING[4]	−4.8	−18.1	− 2.6	5.3	4.8	4.2	4.9

(1) Including soaps, paints, fertilizers, compressed gases, pesticides, cosmetics, etc.
(2) Based on last three quarters of '56 only. (3) Based on '56 figures for "petroleum refining" only. (4) Except newspapers.

CPI's Momentum Builds for '59 Peaks

The fourth quarter's highly beneficial effect on CPI companies' 1958 performances is detailed in a government report, out this week.

The new report shows:

- For makers of chemicals and allied products, last year's final quarter brought all-time record sales and earnings.
- For basic chemical producers, hit relatively hard by the 1957-58 recession, it boosted profit margins far along toward the 10% level realized in '56.
- For most other process industries, the last three months of '58 brought hefty gains in earnings and sales alike. In only one branch of the CPI—stone, clay and glass products—was fourth-quarter business inferior to third-quarter results; and this one exception could be traced to seasonal factors.

12-Month Sales Peak: Instead of the expected decline in sales from the $23.427-billion peak posted in '57, last year saw sales of chemicals and allied products inch upward to $23.555 billion. This is a new all-time high for the sixth year in a row.

The record was due largely to the fourth-quarter spurt, in which this industrial category's sales mounted 3.2% from the previous quarterly record of $6.05 billion in the third period to a new peak of $6.26 billion. This made last year's second-half sales 5.7% higher than those of the last six months of '57.

Even more encouraging for makers of chemicals and allied products was the fourth-quarter pickup in profits. Last-quarter net earnings after taxes totaled $470 million—up 10.3% from the third quarter and nearly 38% better than '58's first period, when the recession was "bottoming out."

Upturn for Basics: Fourth-quarter business was still more of a help for producers of industrial chemicals. At the end of the third period, their '58 sales and earnings were trailing '57 levels by 7.8% and 27.4%, respectively. Twelve-month comparisons were greatly improved by the fourth-quarter upturn, in which sales climbed to a new peak of $2.679 billion and earnings, at $256 million, nearly equalled the apex of $258 million reached in the last quarter of '56.

Pharmaceutical companies' sales and earnings hit new highs last year; 12-month totals were $3.350 billion and $343 million, respectively. But these companies were not immune to the profit squeeze that has been afflicting industry in general. Their average profit margin wavered throughout the year and in the second period fell below 10%.

Metals Most Mercurial: As usual, the primary nonferrous metal industry was the CPI segment with the greatest fluctuations in earnings. For more than two years, its quarterly profit totals were on the downgrade, dropping from $256 million at the start of '56 to only $69 million last spring. Fourth-quarter earnings were up 78.3% from that low point.

For makers of chemicals and allied

products, '58 brought some significant gains in most balance-sheet items. Total working capital was up 3.5% to $6.36 billion; net property value rose 5.8% to $8.86 billion; and total stockholders' equity (book value) climbed 5.2% to $14.49 billion. Total current assets mounted a slim 1.7% to $9.76 billion.

With gross value of property, plant and equipment up 7.5% to $16.7 billion, there was a corresponding increase of 6.7% in set-asides for depreciation and depletion. Of fading importance in this connection: rapid amortization of facilities built under certificates of necessity issued by the federal government during the industrial preparedness drive that was started in '50.

Chemical companies' write-offs of such facilities peaked at $162 million in '55, when they amounted to nearly 20% of the companies' total depreciation and depletion. But in '58, rapid amortization was down to $77 million, only 7.6% of total depreciation and depletion.

Du Pont Decision Due

Court hearings on the government's plan to divest Du Pont of its General Motors stock ended on a surprising and possibly prophetic note last week in the Chicago federal district court. Presiding Judge Walter La Buy read a letter from an elderly Du Pont stockholder expressing her worry that a ruling in favor of the government's plan would mean a big "tax bite" and would depress the stock's value.

La Buy read the letter without comment, but observers believe his action foreshadows the tenor of his decision. They recall La Buy opened the hearings seven weeks ago with the comment that the court was seeking a solution that would not penalize "those who may become innocent victims of this case, the stockholders . . ."

La Buy will retire to make his decision after receiving briefs from the government and the defendants—Du Pont, General Motors, Christiana Securities, and Delaware Realty. They are due during the next 60 days, although the government, followed by the defendants, is expected to ask for more time. In any event, La Buy is reported anxious for a fast conclusion and is expected to make his decision by early fall.

Waving the Pollution Club

Up to now, the agencies charged with carrying out the federal law on water-pollution control have been speaking softly. This week, for the first time, they brandished the big stick that Congress armed them with three years ago.

Process companies — particularly those with plants located on the banks of interstate rivers—have a big stake in the way this law is enforced. That's why they're studying the situation behind the first big crackdown:

• Two years ago, Iowa asked the U.S. Public Health Service to help with a problem of pollution in the Missouri River. In making the request, Iowa beat Nebraska to the draw.

• Officials from PHS and water-control agencies of Iowa, Nebraska, South Dakota, Kansas and Missouri got together last July 24 and agreed that pollution at eight locations should cease. Seven of the communities accepted that judgment and are taking steps toward abatement; but Sioux City—a meatpacking center in northwest Iowa—refused to budge.

• In the face of that defiance, Health, Education & Welfare Secretary Flemming appointed an eight-man board to hold a public hearing, in accord with the '56 pollution-control act. Each state named one member; a sixth was chosen by Secretary of Commerce Strauss; two others—including the chairman—were selected by Flemming from water-control commissions of other states.

• Representatives of Sioux City and of 10 industrial plants there appeared before the board at a four-day public hearing in Sioux City late last month.

• At the conclusion of the hearing, the board made formal recommendations calling for joint effort by the city and the 10 firms to collect and treat all their sewage through a municipal system. This plan was to be carried out in five stages.

• Flemming accepted this recommendation and handed down an enforcement order—the first one to be issued under the '56 law—setting March 1, '63, as the date for completing the project. At each stage, the 11 respondents are to report to PHS and the Iowa Health Dept.

• If any of the respondents fails to comply with the order, Flemming can refer the case to the Justice Dept. for court action.

The Sioux City case is the only one of 11 such cases that has been carried to that point. One other case—at St. Joseph, Mo., also on the Missouri River—is now approaching the hearing stage. In the nine other cases, PHS has been able to get prompt agreement and action by communities and industries.

A number of process industries companies are complying promptly and voluntarily. At Wood River, Ill., Shell Oil and Standard Oil of Indiana have eliminated phenol discharges and restored the palatability of the water down the Mississippi River from their refineries. At nearby Granite City, Ill., Union Starch & Refining Co. built an effluent-treatment plant.

The PHS and several paper and gypsum companies with works along the Columbia River and its tributaries are cooperating in studies to determine the pollution-control measures needed there. And radioactive wastes are the subject of investigation by an industry-PHS conference in the Colorado-New Mexico area.

CSC's New Chiefs

The new lineup of Commercial Solvents' top officers took shape last week when the board of directors elected Maynard C. Wheeler president and Jeremiah Milbank, Jr., chairman of the board's executive committee.

The election was a postscript to the power shuffle that culminated two months ago in the resignation of President J. Albert Woods (*CW, Feb. 28, p. 21*).

Milbank, whose family reportedly owns at least 25% of Commercial Solvents' stock, and Paul V. Shields, another stockholder, had demanded a change of management. Wheeler, a director and formerly senior vice-president, stepped in as acting president.

Milbank's new post had also been held by Woods.

In addition to Milbank, other newly elected CSC directors are William Burch, Arthur Palmer, Jr., H. V. Sherrill and Paul Shields.

Meeting schedule was tight, kept attenders stepping fast.

ACS Draws Active Crowd

More than 8,200 chemists and engineers flocked to the American Chemical Society's 135th annual meeting last week in Boston, and heard 1,400 reports sponsored by the society's 20 scientific and technical divisions. The papers ranged from protein synthesis and radioactive fallout to improved programs for science education.

The protein synthesis was the work of two Florida State University chemists. They heated mixed amino acids to form a product that closely resembles natural protein in chemical behavior and points to the possibility of developing artificial protein fibers and foods.

In another development reported at the convention, Eric Fowler, of the University of California's Los Alamos Scientific Laboratory, has turned up evidence that plants may be able to discriminate against cesium-137 (a dangerous fission product of atomic explosions). If so, this might mean that plants could be selectively bred so that the foliage retains a minimum of cesium.

New Drugs Described: A cluster of new drugs also clamored for attention at the meeting.

Along with Eli Lilly's new ultra-fast-acting barbiturate, methohexital (*CW Technology Newsletter, April 11*), Lederle Labs and Irwin Neisler and Co. (Decatur, Ill.) unveiled new pain-killers.

Lederle's drugs — called diampromid and phenampromid—boast a new type of chemical structure, simpler than codeine and morphine, but comparable in potency.

Neisler's new material is both pain-killer and muscle relaxant. It is described as 2-(β-hydroxyphenethylamino)-pyridine hydrochloride.

Pfizer took the wraps off a new family of mental drugs, some forms of which are still being researched. One of the agents, nialamide, overcomes drug-induced depression in animals and is reportedly less toxic than some other antidepressive drugs now available.

Delegates also sized up a new technique in science education that has been successfully tried at the University of Akron and which may eventually prove a time- and money-saver. Chemistry students watch movies of lab experiments, instead of carrying them out. Tests show they learn lab technique as well as do students who actually perform lab work.

Strife in Argentina

U.S. chemical companies are now anxiously watching the desperate struggle of President Arturo Frondizi to keep the lid on his country's explosive political situation. At stake are their mulitmillion-dollar investments that will soon be swelled by $175 million in new projects.

Following last week's bloody labor riots — which converted downtown Buenos Aires into a battlefield, left one dead and 17 seriously wounded— President Frondizi expelled five Russian and Rumanian diplomats for their alleged roles in the demonstrations.

But, although the Communists are clearly active in the mounting upheavals, Frondizi is really confronted with massive public outrage at his economic austerity policies.

Desperate to fill a drained treasury and start paying off over $3 billion in foreign debts, Frondizi sharply trimmed his nation's budget at the beginning of this year. He wiped out government support of the consumer market, clamped down on imports, devalued the peso, doubled electric power prices, and moved to oust 400,000 state employees by next May.

As a result, the cost of living has doubled, and unemployment may hit 10% of the labor force by the year's end. And when the labor unions demanded a 60% pay boost, the government offered 45%.

The unions rebelled. After calling a general strike last month—which the army broke by deposing the labor leaders — the unions, including the chemical workers, began new strikes.

'One Way to Go': Among U.S. firms affected: Sterling Drug's Geniol Co., Merck, Parke, Davis, Johnson & Johnson, and Squibb.

So far, most U.S. companies are not seriously alarmed. The eight U.S. chemical companies that have projects under way totaling $175 million haven't changed plans. Koppers, which is putting in a $24.5-million petrochemical investment, explains, "We realized there would be rough periods, and there will be more. But the country is basically solid, and its economy has only one way to go—up."

Other observers are more worried. As the probability of even graver troubles looms higher, they wonder how long the military will back Frondizi before seizing direct power.

COMPANIES

Foster Wheeler Corp. will be acquired by North American Aviation through a one-for-one stock exchange, if stockholders approve at special meetings tentatively slated for July. North American would issue an additional 595,473 shares, about 7.3% of its present outstanding stock.

•

Nopco Chemical Co. (Newark, N.J.) will buy out another New Jersey chemical concern, Jacques Wolf & Co. (Clifton). Wolf's principal products: detergents, hydrosulfites, water-soluble gums. Nopco will operate Wolf as a wholly owned subsidiary.

•

The Leon Chemical Industries, Inc., has been set up by two engineers in Warren, Mich., to produce acrylic coatings for glass and metals, paint intermediates, and formulated epoxy.

•

Reichhold Chemicals is making another acquisition, its second in a month. The latest: Alkydol Laboratories, Inc. (Chicago), synthetic resin producer. The deal will give Reichhold its second plant in the Chicago area. Earlier this month, Reichhold purchased Specialty Chemicals, Inc. (Austin, Tex.).

•

Reynolds Metals Co. has signed a 15-year contract with Arkansas Louisiana Gas Co. Arkansas Louisiana will pipe gas from Reynolds' fields in Louisiana to Reynolds' Arkadelphia, Ark., alumina plant. The gas company now supplies Reynolds with 82 million cu.ft./-day; under the new contract, it will continue to supply part of Reynolds' gas needs. The contract goes into effect Jan. 1, '60.

EXPANSION

Liquid Hydrogen: Union Carbide's Linde Co. division has won the National Aeronautics and Space Admin. liquid hydrogen contract and will expand its Torrance, Calif., plant to fill it *(CW Technology Newsletter, March 28)*. The five-year contract, for which Linde outbid three other companies, calls for no guaranteed purchase amount. The new facilities are slated to be in production by April '60.

•

Film Products: Du Pont will probably firm plans for a new film products plant within the next few months. It is revaluating its 910-acre site at Florence, S.C., and is reportedly already drawing up building plans. Meanwhile, it is going ahead with a major expansion of its Chestnut Run (near Wilmington) film sales development and customer service lab, will add 23,000 sq.ft. at a cost of more than $1 million. Major reason for the expansion, Du Pont says, is "rapid development of products emerging from Du Pont research." Major programs are under way for its Teflon FEB-fluorocarbon, polyolefin, polyester, and polyvinyl fluoride films. The lab will also help develop new types of cellophane, including polymer-coated types.

•

Toiletries: Colgate-Palmolive Ltd. will launch a $1-million expansion of its Toronto plant this summer, expects to double Canadian sales of Wildroot products within the next 12 months. They were added to the Canadian company's line when its U.S. parent recently picked up Wildroot.

•

Nuclear Fuels: Vitro Corp. will build a $3.5-million fuels reprocessing pilot plant at Oak Ridge, Tenn., to handle fuels from the newer reactors as well as larger elements from the older types. It will be linked up as a "head end" unit to existing facilities. Vitro also has a contract to build a high-radiation-level plutonium lab at Oak Ridge.

FOREIGN

Subsidiaries/Latin America: Hooker Chemical Corp. has set up two new foreign subsidiaries. Its new Bahamian subsidiary, Hooker Chemical International Ltd., will handle production and sales in Latin America. And Hooker Mexicana will produce phosphates in Mexico.

•

Agricultural Chemicals/England: Dow Agrochemicals Ltd., the company Dow Chemical set up last year with British scientist W. E. Ripper to sell its selective weed killer, will build a $2.8-million plant in Norfolk. Output will be distributed in Britain, the Commonwealth and other countries outside the U.S.

•

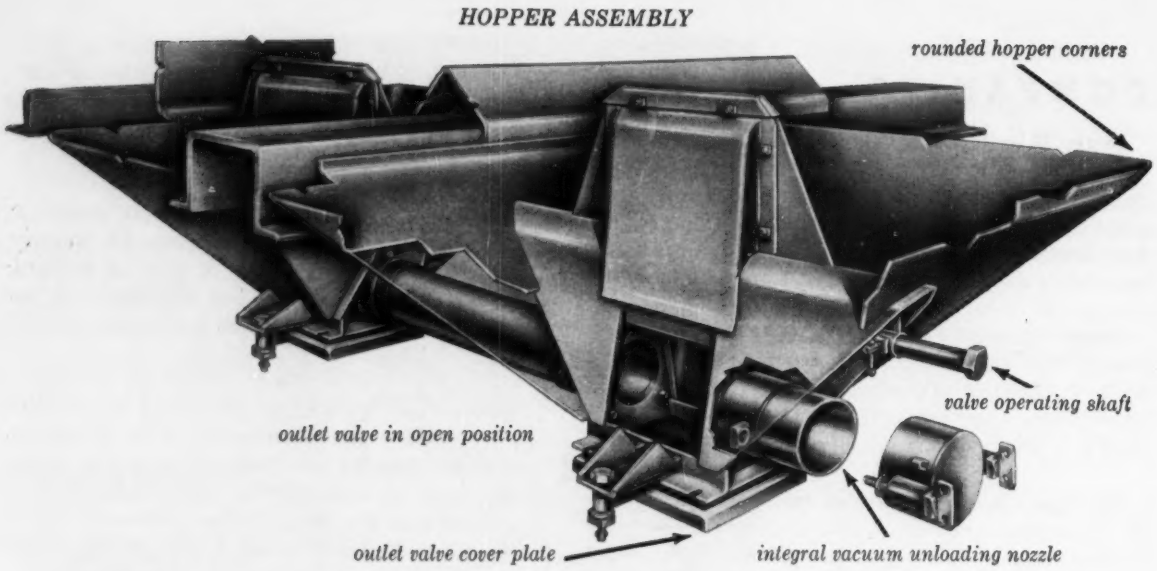
Tires/France: Goodyear will build a $7-million tire plant in France. Engineering is already under way, and a site will be chosen soon.

•

Textile Chemicals/Argentina: A new company, Fabrica Argentine de Hidrosulfita y Afines S. A. (Sulfisud) has started producing textile dyestuffs and bleaching agents in San Nicolas, near Buenos Aires. Output will fill Argentina's requirements. Sulfisud is a joint subsidiary of Badische Anilin- & Sodafabrik and Compania Quimica S.A.

•

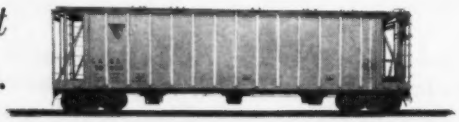
Petrochemicals/Germany: Erdoelchemie GmbH, joint subsidiary of Farbenfabriken Bayer and BP Benzin und Petroleum AG., has put onstream the first units of its highly automated petroleum complex. Onstream: a 65,000-tons/year benzene cracker, a Linde gas separation plant, ethylene and ethylene glycol plants. Due onstream by '61 are facilities to turn out a total of 45,000 tons/year of ethylene, 36,000 tons of ethylene oxide, 18,000 tons of ethanol, 20,000 tons of propylene oxide. Total investment will reach $71.4 million.



PROTECTED UNLOADING GATES OF DRY-FLO* CAR KEEP LOAD SAFE FROM CONTAMINATION

Unloading gates of the DRY-FLO car are entirely within the car insuring ease of operation and eliminating pickup of foreign material. Gates open and close vertically and are not subject to pressure from within. The rate of flow of product through the unloading gates can be adjusted as desired.

The DRY-FLO car is ideal for bulk shipment of dry ingredients, particularly products that *must be protected* from contamination.



COMPETITIVE IN PRICE WITH OTHER COVERED-HOPPER CARS—DO SO MUCH MORE

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DRY-FLO CAR DEPARTMENT

GENERAL AMERICAN TRANSPORTATION CORPORATION

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In Canada: Canadian General Transit Co., Ltd., Montreal
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Washington
Newsletter

CHEMICAL WEEK
April 18, 1959

This week's ban on most coal-tar lipstick colors poses real problems for the cosmetics industry. Seventeen colors were delisted by Food and Drug Administration order, including several widely used in lipstick and lip rouge. This will mean a big scramble for new ways to produce those subtle differences in shade.

There have been no reports of human injury from these coal-tar colors, but tests show "definite injury" to animals in amounts of 0.25 to 2% of the diet—far more than ever gets into the human system. FDA is following a U.S. Supreme Court dictum that says any additive that gets into the body must be "absolutely harmless."

FDA says present stocks of colors will have to be used only in rouges and other cosmetics that are not applied to the lips or mucous membranes, once the order becomes effective—30 days from now, plus whatever delays are caused by court appeals.

The colors moved to the External Drug and Cosmetic Dyes List are seven tested in the lab—D&C Oranges 5 and 17, D&C Reds 9, 10, 19 and 33, and D&C Yellow 7—plus another 10 colors similar in chemical structure: D&C Reds 8, 11, 12, 13, 20 and 37, D&C Oranges 6 and 7, and D&C Yellows 8 and 9.

•

A $350-million investment in development of chemicals, cement, bauxite, aluminum and hydroelectric power in Ghana has been proposed by the Kaiser Industries, backed by an International Cooperation Administration investment guarantee. Kaiser would put up all the money.

First step is to build a dam, then develop Ghana's four known bauxite deposits, then build plants to produce alumina, aluminum, steel chemicals and cement. Prime Minister Kwame Nkrumah is expected to approve the program within the next week to 10 days. If it goes through, it will be one of the largest single U.S. private investments overseas since World War II.

•

A proposed cut in freight rates that has broad CPI significance has been temporarily blocked by the Interstate Commerce Commission. The Minneapolis, St. Paul & Sault Sainte Marie Railroad (the Soo Line) is spearheading a railroad drive to cut costs for customers that ship 90% of their cargo with one line—a move being closely watched by big shippers of cement, fertilizer, etc. But ICC has suspended for seven months the Soo Line's move to cut freight costs on pipe and tubing and steel or wrought iron for its "90%" customers by $2.13/net ton from Sault Ste. Marie, Ont., to Chicago.

Truckers and water carriers have blasted the proposal as a "weapon of destruction" for them, though many major CPI customers have advocated similar moves.

The opposing carriers claim this is merely the opening wedge by the railroads to spread the practice of guaranteed annual rates across the nation and squeeze out truck and waterway competition. The issue is sure to be hard fought in the months ahead while the ICC investigates.

•

Electric power could be produced for 8-9 mills per kilowatt hour from three different types of reactors, design studies indicate, if private industry or the government would build big plants—those in the 3,000-kw. range. This would make nuclear electricity competitive with conventionally produced power in some high-cost areas of the U.S. today. The studies were made by six top engineering and manufacturing firms. Their objective: to find the most economic size and design of boiling-water, pressurized-water and organic-cooled reactors.

•

AEC's "tough" patent policies will continue, in all probability, for another five years. The commission's patent statutes expire Sept. 1, but AEC wants them extended another five years. A bill to do that has been introduced by a top member of the joint atomic committee, Rep. Chet Holifield (D., Calif.), and the full committee will probably go along. Hearings are set for April 21-24.

Industry complains that AEC's patent regulations are the toughest of any government agency's. The commission makes almost all patents developed under government research programs available to everybody—on grounds that the few companies now getting atomic research contracts should not be allowed to build up patent monopolies. Industry representatives say this robs them of incentive to make any big capital outlay for development of peaceful uses of atomic energy.

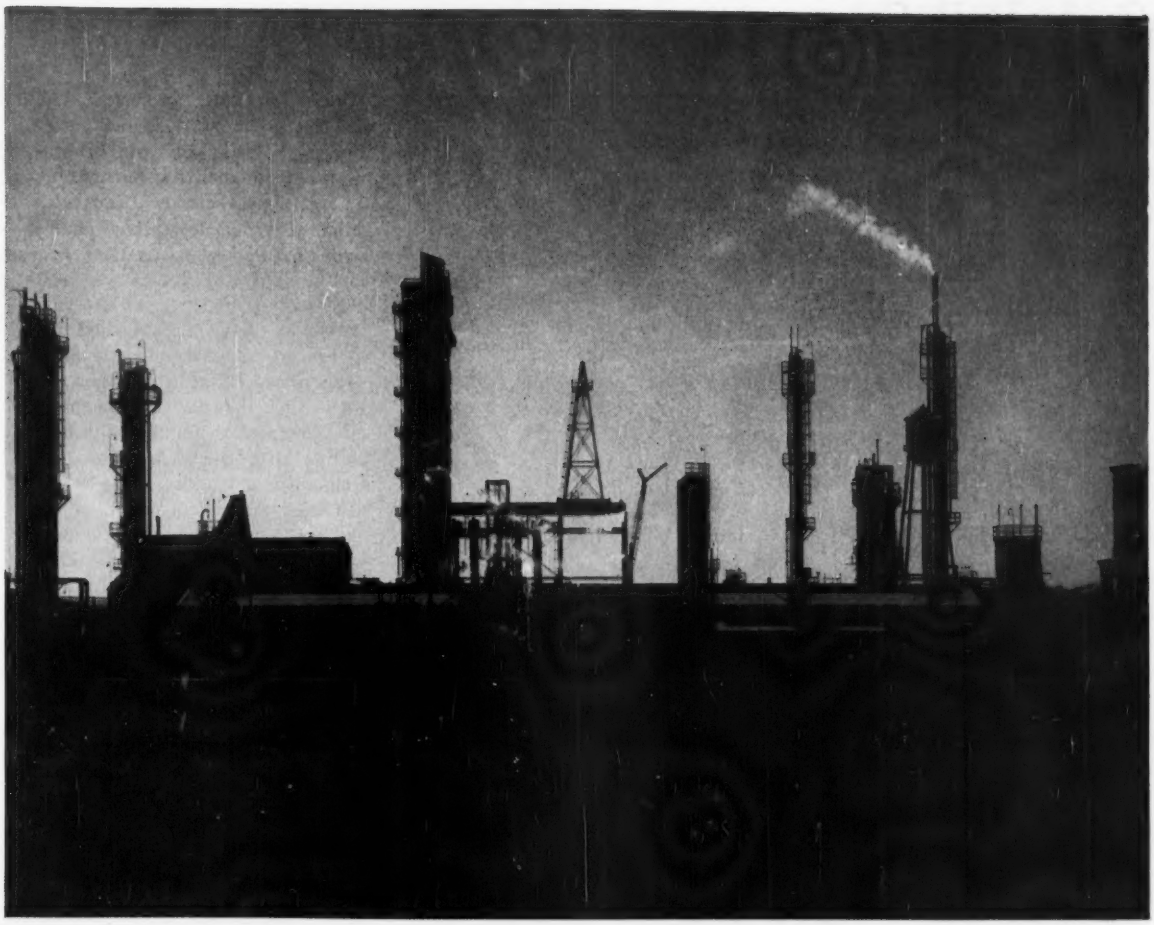
There may be some loosening up on patents from peripheral work not under direct contract. The AEC also recommends that appeals from its decisions be made to a federal court instead of the Patent Office's Board of Patent Interferences.

•

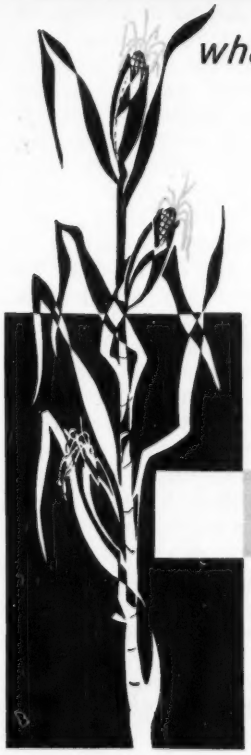
Isotope use has yielded annual savings of $6,635,426 for chemical companies, according to a study that has just been completed by the National Industrial Conference Board for the Atomic Energy Commission. Some 772 companies in 18 industries received mail questionnaires; 100 companies were visited by interviewers. Total measurable savings are estimated at $39 million/year—but the report indicates that many companies that could use isotopes profitably are not doing so.

Gauge applications and control of manufacturing processes are among the uses, playing an important part in paper, steel, nonferrous industries, etc.

The petroleum industry gets the most benefits of any industrial group, the report finds. Oil refiners report savings of $11.5 million on an annual investment in equipment and facilities of $70,248.



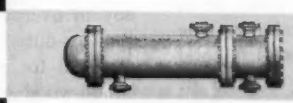
what do thermal ratings mean to an ear of corn?



. . . accurately rated Western heat exchangers, used by Grand River Chemical Division of Deere & Company at Pryor, Oklahoma, play a significant role in Grand River's production of urea, using natural gas as the feed. As a commercial fertilizer for crops of all types, urea is increasing rapidly in popularity.

From fertilizer to nuclear power, the petrochemical industry demands unerring accuracy and efficiency from heat transfer equipment. Western is happy to serve these ends.

A Western representative is ready to discuss your processing problems at your convenience.



WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

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CW PHOTO—LIONEL CRAWFORD

Polyethylene bag in wirebound-box may prove a challenger.

New Rival for Carboys

Disposable containers for 15-gal. quantities of liquid chemicals came to the forefront this week. Hedwin Corp.'s new wirebound polyethylene-pouch unit, called the Cubitainer, is one of the eye-stoppers for chemical packaging men at this week's huge National Packaging Exposition in Chicago.

At the same time, Jones & Laughlin Steel Corp. and the Plax Corp. displayed a seamless, one-piece, blow-molded, 10-mil thick polyethylene liner for J & L's disposable, 5-gal. container, the JaLiner. And, J & L also disclosed it was readying a 15-gal. JaLiner (with polyethylene liner) as its contender for a share of the larger disposable-container field.

There's good reason for the interest in disposables. Chemical packaging engineers are moving away from returnable containers. They believe hard-to-measure costs of return trips, cleaning, repairing, deposit crediting and paperwork often offset savings afforded by reusability. One industry source estimates that total per-trip costs amount to upwards of $2.25 for glass and polyethylene carboys in overpacks — Cubitainer's projected major competition. (Some 10 million shipments are made each year in returnable, 13-15-gal. containers.)

Packaging men see the big Cubitainer* and the projected 15-gal. JaLiner not only as serious competition for polyethylene carboys but also as the death-knell for the traditional 13.5-gal. glass carboys. Competition from polyethylene carboys has already induced glass-container manufacturers to stop production of the glass carboys. Because of the latter's reusability, however, they are likely to remain in service indefinitely.

Specifications and relative costs show why the new Cubitainer will offer competition for the polyethylene carboy with overpack. The 15-gal. Cubitainer measures about 19 x 17 x 17 in., occupies 3 cu. ft. of space and has a tare weight of 14 lbs. Its wirebound-wood overpack knocks down to 0.5 cu.ft. The polyethylene insert is of molded construction, has a built-in, collapsible plastic spout with cap that tucks into the insert, thus permitting a flat outside surface for the container. A corrugated paperboard liner protects the plastic pouch from abrasion.

The conventional 13.5-gal. glass carboy weighs some 70 lbs., occupies about 7 cu. ft. of storage space, can be reused many times.

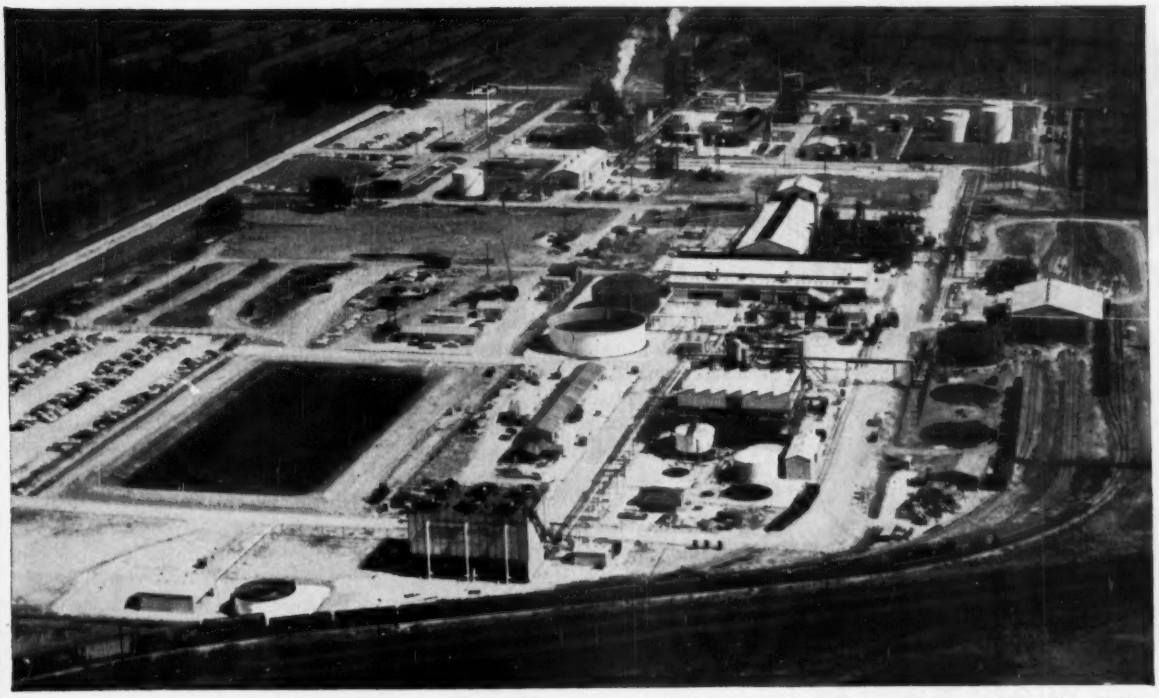
The Cubitainer will probably compete most directly with 13-14.7-gal. polyethylene carboys in a variety of overpacks. And it may prove to be a closely contested battle. Polyethylene carboys of 14.7-gal. capacity come in two weights — a heavy-duty 9-lb. type and a regular-duty, 5.75-lb. version. With a corrugated paperboard overpack, the regular-duty model tares in at about 10 lbs.; with a wirebound-wood overpack, at about 28-30 lbs. The cube for the wirebound-wood overpack requires about 4.5 cu. ft.

Cost Factors: Cubitainer will come to the marketplace at a price that Hedwin terms as "under $3." That's close to the cost for reprocessing returnables. The traditional glass carboy in overpack sells for about $15. Regular-duty polyethylene carboys now sell for about $10 with a wirebound-wood overpack, about $7 with a corrugated paperboard overpack. But the original cost of carboys is, of course, reduced by their reusability.

Stackability is another big factor.

*Cubitainers with corrugated paperboard cartons have been available in sizes up to 5 gal. for several years.

Industry confirms Wyandotte's CONFIDENCE IN THE SOUTH



Aerial view shows Wyandotte's new, modern Geismar Works immediately south of Baton Rouge, Louisiana. The chlorine-caustic plant (foreground) recently came on stream. Ethylene oxide and ethylene glycol facilities are in the background.

It's an exciting thing to see a new plant spring to life . . . to see the end results (chemical raw materials in our case) leave the premises.

Our ethylene oxide plant, with an annual capacity of 60 million pounds, has been on stream since last July; our chlorine-caustic plant is now producing . . . its projected daily capacity: 300 tons of chlorine and 330 tons of caustic.

Impressive though these quantities may be, they have small meaning until they are put to use — to make our plant a purposeful part of the industries we serve . . . petrochemical and petroleum, pulp, paper and textiles, as well as rayon, detergents, non-ferrous metals and a host of others relying upon process chemicals.

That's why we take great pride in the many orders we have received. They confirm our confidence in the South . . . and insure our future in this dynamic growth region.

These three "firsts" (on the following pages) from our new caustic-chlorine facility at our Geismar Works—immediately south of Baton Rouge, Louisiana—give you an idea of what we mean.

May we serve you . . . soon? *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

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MICHIGAN ALKALI DIVISION

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VIRCO-PET 20 is a tan-colored, viscous liquid, (sp. gravity $\frac{20}{4}$ – 0.96 – 1.00; viscosity (stokes) 10.5-11.5). Readily emulsifiable in water, VIRCO-PET 20 is soluble in acetone, ethanol, ethyl acetate, carbon tetrachloride, benzene, kerosene, gasoline, mineral oil, and ethylene glycol.

Get full information on ending container corrosion... preventing corrosion of *all* metal surfaces wherever found.

V-C

Write today, on your company letterhead, for complete data and VIRCO-PET 20 samples.

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How the Containers Compare

	Polyethylene Carboy in Wirebound Box	*Glass Carboy in Wood Box*	*Cubitainer with Wirebound Box*
Capacity, gallons	14.7	13.5	15
Tare weight, pounds	29 lbs.	70	14
Cube, cubic feet	4.5	7	3
Service life	reusable	reusable	not reusable
Cost	$10	$15	under $3

Cubitainers can be stacked without need of spacers. Carboys require spacers (because of the neck protrusion) or stagger stacking, unless they are packed in an export overpack (which covers the neck).

A Manufacturing Chemists' Assn. packaging task force concerned with nonreturnable plastic composite containers has evaluated—and approved — the Cubitainer's performance. The group put the units to compression, incline-impact, vibration, drop and rough-handling tests.

The Interstate Commerce Commission may soon also give the unit its approval. It has prepared specification 2U, which will soon be published. With publication comes ICC authorization for regulatory (hazardous) and nonregulatory products. Currently, shipment can be made on test-shipment permits.

Hedwin expects that the unit will be suitable for almost all chemical products that can now be shipped in polyethylene. Smaller Cubitainers are now used for muriatic, phosphoric and sulfuric acids, sodium and potassium hydroxide solutions, ethylene glycol, calcium and sodium hypochlorite, water-base paints, cosmetics, shampoos, a wide range of cleaners and a host of other products. Important markets for the 15-gal. size are expected to develop in liquid fertilizers. Food packaging applications will also be pursued.

Distribution plans for the 15-gal. Cubitainer have not yet been settled. To start, Hedwin will ship the entire unit, polyethylene pouch and overpack from its Baltimore factory. Later, licensing arrangements may be worked out for distribution through wirebound-wood box producers.

Ahead: For the time being, the 15-gal. Cubitainer will be offered only with the wirebound-wood overpack, although a corrugated paperboard overpack is under development. Unless a suitable handle can be

Mechanical 'squeezer' measures overpack's compression resistance.

Industry confirms Wyandotte's

CONFIDENCE IN THE SOUTH

A scale model of a Wyandotte tank car is presented to Wilbur F. Gillespie, General Manager, Gaylord Container Division of Crown Zellerbach Corporation, Bogalusa, La., by Charles F. Gerlach, Wyandotte Inorganic Chemicals Sales Manager (right), and Scott Starkey, Wyandotte Southwestern District Manager. The event marked the occasion of the first tank-car shipment of caustic soda from Wyandotte in the South.

1ST tank car of caustic soda from Wyandotte's new Geismar Works, Baton Rouge, La., delivered to the Gaylord Container Division of Crown Zellerbach Corporation

"Gaylord corrugated boxes go everywhere, and products that are in them travel *first class,*" states Wilbur F. Gillespie, General Manager, Bogalusa, La., Mill, Gaylord Container Division of Crown Zellerbach Corporation. "As a leading manufacturer of containers for every need, we not only sell in the South, we produce in the South as well as in every other section of the United States. Wyandotte's new facility marks another milestone in the already great progress of the South . . . we're proud to be the recipient of the first tank car of caustic soda delivered from this new Wyandotte location."

Wyandotte CHEMICALS
MICHIGAN ALKALI DIVISION

Pacing Progress with Creative Chemistry

Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.

worked out, however, the paperboard unit will probably be authorized for nonregulatory products only.*

Next step, says Hedwin, will be development of larger disposable containers, possibly as big as 55-gal., to compete with steel drums.

Just what respective market niches 13-15-gal. polyethylene carboys, Cubitainers and steel pail-polyethylene bag types of containers will win is, of course, a matter of conjecture. If the 15-gal. steel-pail and polyethylene insert container comes in at prices competitive with Cubitainers, as is very likely, the battle will be fierce. Some feel that the container market will eventually stratify itself, with each unit pretty much confined to certain products. The polyethylene carboy, for example, will certainly continue to see service where a high degree of protection is necessary, and where return is not a problem.

Undoubtedly, considerable time will pass before the intermediate-size container market resolves itself. Chemical packaging and purchasing men will have some new decisions facing them — but they stand to gain no matter what they choose.

Latin Market Trouble?

Drug and chemical markets in Cuba and Brazil, two of the U.S.'s best Latin-American customers, continue in ferment this week.

Cuba, after slashing prices 20% on imported drugs and 15% on pharmaceuticals of local manufacture, is now eyeing sharp boosts in drug tariffs. And there's a chance that fertilizers may soon be subjected to price-cutting legislation.

From Brazil, the news is good. As a result of discontinuing Limited Convertibility Area currency exchange auctions, U.S. products have become more competitive with European offerings. Moreover, duties on many chemical imports from the U.S. will be cut.

Cut-Rate Rx: Drug industry men in Cuba predict a glum future. The recent price drop decreed by the Castro government may well pare total Cuban drug sales from $30 million to $25 million this year. Although large firms will take the cut in stride, reports an on-the-spot *CW* correspondent, it will affect their profits. Harder hit will be some 400 small Cuban laboratories, some of whom buy supplies from U.S. firms.

The prospects of a higher drug tariff are more certain. Drug industry spokesmen fear they will be raised to a "prohibitive" level by late '59. Such a revision would be in line with the revolutionary government's program to boost consumption of locally produced products, encourage industrialization and save Cuban foreign exchange. But it could mean the U.S. could lose some $14 million worth of drug exports.

Coupled with the likely high tariff is an expected increase in Cuban wages. Labor unions there are pressing for a general 20% hike at the end of the sugar harvest in May. Should the unions win their way, perhaps as many as half of the small independent Cuban drug laboratories and half of the labs affiliated with U.S. producers may have to shutter their doors.

Currently, little is certain about the possibilities of fertilizer price cuts. But the government has begun a campaign to lower plant nutrient prices. That might mean that price-paring laws similar to the drug decree are in the wind.

Brazilian Developments: Improved outlook for exports of some U.S. chemicals to Brazil stems from the change in "convertibility auctions" and moves to lower duties. Previously, Brazilian traders used two standard currency units—that is, they paid local currency to the government to get a quantity of export currency units. If they were to trade with the U.S., they "bought" U.S. dollars; if they were to trade with Europe, they bought a wholly fictitious unit called the "limited convertibility area dollar." Price or exchange rate for these units was not fixed; blocks of exchange units were regularly auctioned at whatever price the government could get. And, usually, U.S. dollars were priced higher than the limited convertibility dollar. In effect, this gave European nations a price advantage. Now, however, Brazil has dropped its limited convertibility dollar, and uses only the U.S. dollar for trade with both Europe and the U.S.

Result: the price advantages stemming from the different dollars that

*The wirebound-wood unit has a built-in gripping space by virtue of the wooden frame.

Industry confirms Wyandotte's

CONFIDENCE IN THE SOUTH

A. L. Ross, Vice President, International Paper Company, Southern Kraft Division, Mobile, Ala., receives a scale model of a Wyandotte chlorine tank car from Charles F. Gerlach (left), Wyandotte Inorganic Chemicals Sales Manager, and R. W. Moister, Wyandotte Southeastern District Manager. The event commemorates the first tank car of chlorine shipped from Wyandotte's new southern facility in Louisiana.

1ST tank car of chlorine from Wyandotte's new Geismar Works, Baton Rouge, La., delivered to International Paper Company

"Industrial growth in all sections is what makes America a growth country," relates A. L. Ross, Vice President, International Paper Company, Southern Kraft Division. "The greater the growth, the greater the market for our products, such as newsprint, fine paper, bleached board, corrugated shipping containers, multi-wall shipping bags, and Kraft paper. The rapidly growing South offers opportunities to many companies. We're happy Wyandotte recognizes this . . . we'll keep this symbol as a reminder of our own first tank-car order of chlorine from Wyandotte in the South."

Wyandotte CHEMICALS
MICHIGAN ALKALI DIVISION

Pacing Progress with Creative Chemistry

Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.

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Alkylation is the key process of lifting hydrocarbons by their own bootstraps, so to speak, to boost the octane number of gasoline to optimum levels for today's civilian and military vehicles and aircraft. It means higher profits for refineries and better fuel for users.

The Refinery Engineering Company, or TRECO, as it is known throughout the U. S. and Canadian oil industry, a division of Vitro Corporation of America, has engineered and built more than half the postwar alkylation plants using the popular hydrofluoric acid catalyst route. These were built on a turnkey basis.

Turnkey alkylation plants represent only one phase of TRECO's service to the oil and related petrochemical and chemical industries. TRECO is a sign of quality engineering and construction throughout these vital American industries.

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- Aircraft components and ordnance systems
- Ceramic colors, pigments, and chemicals

SALES

European countries formerly enjoyed have been largely eliminated. Another important result is that "triangular or swap deals" with Iron Curtain countries have been largely eliminated.

Under the old system, Brazilian-based importers could buy exchange units for imports from an Iron Curtain country and swap them—bypassing the Brazilian government—for units or goods of some European country. Now, import control has been tightened and importers must prove that imports originated in the country whose currency they bought.

Tariff Twists: Brazil's tariff program has two facets. Levies on chemicals now coming into production in Brazil will probably be boosted. But the tariffs will be cut or eliminated on DDT, many vitamins and processed sulfur. The country also intends to keep duties at present levels for many nitrogenous and phosphatic fertilizer materials, colorants, halogenated hydrocarbons, borates, perborates and manganese dioxide.

Developments in Cuba and Brazil point up the general outlook in Latin-American chemical markets (*CW, March 15, p. 44*): that U.S. exporters are in for increasingly uncertain marketing conditions.

DATA DIGEST

• **Polymers, copolymers:** Reference book describes advantages, uses and physical properties. Formulations given for use in floor tile, inks and coatings. Also included: test methods for resin evaluation, Rubber Corp. of America (New York).

• **Polyvinyl chloride:** New catalog on piping, fittings and valves, made of Koroseal, covers normal and high-impact materials, lists specifications and physical properties, with data on common chemicals that can be handled with the product. B. F. Goodrich Co. (Akron, O.)

• **Tantalum:** Four-page folder describes applications of tantalum in electronic, nuclear, chemical and missile industries, discusses various forms in which the product is available, such as powder, vacuum melting stock, arc-cast ingots, tubing, sheet, wire and foil. Tables give chemical analysis along with mechanical and physical properties. National Research Corp. (70 Memorial Dr., Cambridge 42, Mass.).

Industry confirms Wyandotte's

CONFIDENCE IN THE SOUTH

A. B. Maley, Vice-President, Chemicals Division, North American Car Corporation, Chicago, Illinois, receives inscribed book ends commemorating the first barge shipment of caustic from Wyandotte's new facility at Baton Rouge, La., to his Alexander Chemical Division at Lemont, Illinois. Making the presentation are Charles F. Gerlach, Wyandotte Inorganic Chemicals Sales Manager (left), and Horace C. Brunner, Wyandotte Western District Manager (standing). This event marks the beginning of expanded water shipments for Wyandotte.

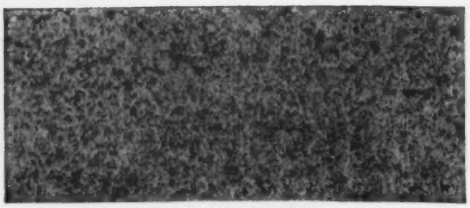
1ST barge shipment of caustic from Wyandotte's new Geismar Works, Baton Rouge, La., delivered to Alexander Chemical Division of North American Car Corporation

"Wyandotte not only supplies us with caustic soda and chlorine," states A. B. Maley, "they also advise us on the best methods to transport, handle, process, store, and use these and other chemicals. Our relations with Wyandotte for 29 years have been a two-way street – helpful to both parties. We're proud to have ordered the first barge shipment of caustic from Wyandotte's new Geismar Works, just south of Baton Rouge. This event further confirms our 1954 decision to build our new plant on the Chicago Ship Canal to accommodate water shipments from the South as well as the Great Lakes."

Wyandotte CHEMICALS
MICHIGAN ALKALI DIVISION

Pacing Progress with Creative Chemistry

Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.



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Water-base carrier is similarly bodied with Ben-A-Gel gellant to restrict globuloid movement . . . to immobilize the whole wet film; to prevent mixing, settling in storage.

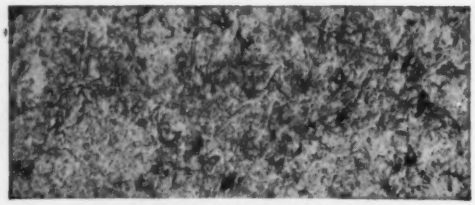
Not only in spatter finishes but in most other paints, gellants developed by National Lead research prevent hard settling, boost hiding, stop sag, improve sprayability and hold-out . . . provide *predictable* gelling action throughout a wide temperature range.

These same National Lead-developed gellants improve flow properties of other compounds such as resin coatings, vinyl dispersions, mastics, cosmetics, adhesives.

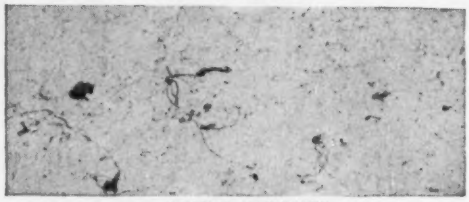
National Lead chemical research aids plastics industry, too

Included among National Lead-developed chemicals are stabilizers for *all* commercial vinyl compounds. In vinyl manufacture, these stabilizers improve lubrication, color retention, resistance to heat and yellowing. In service, they improve resistance to weathering, fading, crazing.

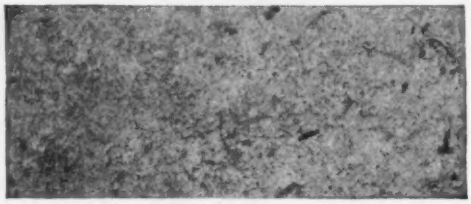
For details on these chemical developments of National Lead Company, check and mail coupon below. Technical assistance in application is yours for the asking.



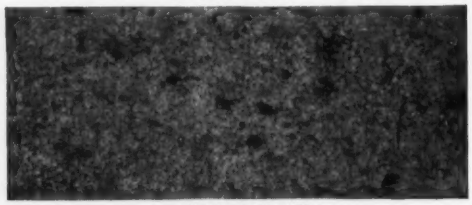
MARBLELIKE EFFECT



ACCENTING "SPATS"



4 COLOR "SPATS"



VARISIZE "SPATS"

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Synthetics: Creating a New Look in Leather

Makers of leather finishes are happily checking leather goods sales figures racked up during the pre-Easter shopping spree. Not only were more than 50 million pairs of shoes sold to women shoppers, but a record number of the new high-style leather coats were purchased as well. The figures for shoes interests the finish makers most, however—almost 85% of all U.S.-made leather goes into the manufacture of shoes. They account for the bulk of sales in the $15-million/-year leather coating field.

This year should be a good one for the shoe manufacturers; they'll sell over 600 million pairs of shoes. The finish makers will share in the general prosperity, but there'll be some vigorous scrambling for each piece of the pie. Some aggressive new competition has entered the leather finish field in the last few years, and makers of conventional finishes will have to work hard to hang on to their markets.

Resins the Reason: Key to the changes taking place in the leather finish field is the switch to synthetic resins. Virtually all the new resins that have scored in other coatings have been adapted to leather finishes. And tanners who 10 years ago were working with combinations of casein, gelatin, albumens, shellacs and waxes are now speaking familiarly of urethanes, acrylics and butadiene-acrylonitrile.

Urethanes: The urethanes are getting increasing attention from tanners because of the job they do in upgrading patent leather. Suppliers of urethane finishes, like UBS Chemical (Cambridge, Mass.), claim their products give patent leather 25 times the durability it had when it was turned out by the traditional linseed-oil method. Besides strong resistance to cracking—it will take 18,000 flexes before it cracks—patent leather produced with urethane finishes won't lose its gloss or be affected by extreme hot or cold weather.

Efforts are now being made to promote patent leather from special-occasion to everyday footwear, give patent leather shoes a bigger percentage of the total footwear market than the 10% they enjoy, mostly in women's and children's shoes.

Two big shoe retailers should help give patent leather —and urethane coatings—a big boost:

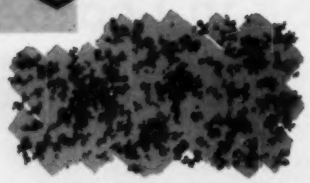
- Sears, Roebuck is currently pushing a line of girl's shoes with the urethane finish, called Young Adagios.
- General Shoe Corp. (Knoxville, Tenn.) is readying a line of men's shoes with a built-in shine, the lasting luster coming from the urethane finish.

Based on the success they've enjoyed in the patent leather field, makers of the urethane finishes are trying to develop formulations suitable for other-type leathers. It's not an easy job. For one thing, urethanes tend to

CW PHOTO—LIONEL CRAWFORD

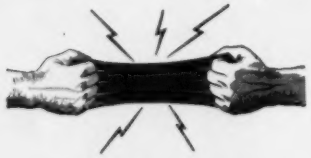
New finishes make bigger markets for leather garments.

COLLOID CORNER



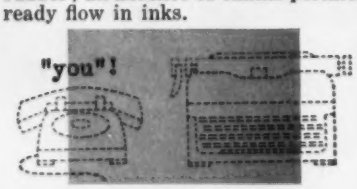
LINKS IN THE MILLI-MU WORLD

Colloidal carbon particles are measured in terms of milli-mu—of millimicrons. There are 30 grades of colloidal carbons. Some have a way of linking—forming chains of varying degrees of complexity. Some of them don't.



ELECTRICAL ELASTIC

The use of certain types of colloidal carbons in rubber provides links by which static electricity may be conducted away. Other types go into electrical resistors. Long-chain and complex linkages provide rigidity in rubber; an absence of chains permits ready flow in inks.



COMMUNICATING CARBON

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COLUMBIAN CARBON COMPANY

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DEPT. A

discolor, and this obviates their use in garments, like coats, where pastel colorings are said to be the trend. (However, this may not be the handicap some tanners think. There was also supposed to be a trend toward colored patent leathers back in the early '20s; but many of the tanners ended up with huge piles of brightly colored leathers that the unbuying public was unaware it wanted so badly. In fact, a handsome business was built up in dyes designed to convert patent leathers from their unsalable brightness to the more acceptable black.)

Another hurdle for urethanes to jump before coming into more general use is cost. The $5-7/gal. price of the finish is considerably higher than the tanner is accustomed to pay for his finishes. Urethanes can be used as a topcoat over cheaper materials, cutting down on cost, but this practice lessens adhesion — one of the big selling points of the urethanes.

Drying is also a problem. It takes longer for urethane finishes to cure than conventional leather finishes; hence the finished sides can't be stacked, creating a space problem for the tanner.

Acrylics on Top: Among the more widely used synthetics are the acrylics. These have been around a long time in base coats, are now finding increasing use as topcoatings. Until the function of particle size was fully understood, acrylic emulsion topcoats gave leather a smooth, plastic look—just what the tanner was trying to avoid. When it was found that a finer particle size produced a clearer emulsion and gave a more natural appearance to the leather, acrylic topcoatings came into more extensive use.

Tanners didn't jump straight from the protein-type finishes to acrylic emulsions (nor have they completely abandoned the older materials); it was a gradual process. Louis Stahl of Stahl Finishes (Peabody, Mass.) told *CW* that many tanners took the first step away from the natural materials into lacquer and lacquer emulsions. This was to meet shoe manufacturers' demands for scuff- and water-resistance — properties needed because of changes in shoe manufacturing methods.

The lacquers did a good job, inexpensively supplying a bright surface with a good feel. They became—and still are — the most widely used topcoating for leather. Because of the safety problems inherent with nitrocellulose lacquers, however, many tanners looked for safer finishes.

Condensation polymers, such as phenol-formaldehyde, melamine and alkyds were then doing a job in paper and textile applications, and it was hoped they'd do an equally good job on leather. Unfamiliarity with the thermosets caused some application problems, and the finishes were often hard and flaky; therefore tanners turned in another direction — this time toward the addition-polymerization-type resins.

Biggest advantage claimed for the acrylics is good flexibility over long periods. There's no need for external plasticizers, and therefore no migration of plasticizers into the leather—a problem with some finishes.

Another virtue: good compatibility with other materials. This is important in leather finishing because tanners always use several coatings, may use widely differing materials in succeeding coats. And the shoe manufacturer also applies a coating over the shoe once it's made.

Acrylic coating manufacturers have been working — as have other finish makers — on a problem that has curtailed some of their sales potential. They need a finish that will allow coated leather to be vulcanized directly to preformed heels and soles—doing away with much of the stitching formerly necessary. Newark Finish Co. (Newark, N. J.) is now readying a product for market that is claimed to eliminate the necessity of roughing the coating or using cements to get adhesion.

Join the Crowd: Because so much work in the tanning field is empirical, there's hardly a material, from evaporated milk to epoxies, that has not been swabbed on leather as a coating candidate. One tanner says that his researchers thought epoxies produced too brittle a finish, silicones made redressing difficult for the shoemakers, and fluorocarbons created the same problem and cost too much besides. The U. S., tanners say, is far ahead of other countries in coating technology. Actually, it's not so much that the U. S. is more progressive; different properties are demanded of

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leather here than abroad. In the U. S. the stress is on good water-resistance and flexibility; in Europe the accent is on high heat-resistance. An interesting fact: in Latin America the tanners use a combination of U. S. and European tanning and coating developments, produce leathers that are soft and smooth like European leather with a grain tight and firm like that common in the U. S.

Though many U. S. tanners poohpooh foreign developments in their field, the shoe manufacturers do not. They have nervously watched imports of shoes climb to 27.5 million pairs in '58 — a jump of 100% over '57. This growing popularity of the foreign product could — as in the auto field — give the U. S. producer second thoughts about the product he's selling, and this could have a strong bearing on the direction that leather coatings take.

Good Market—But: Though plastics have made inroads into the shoe market, it will be a long time before any material seriously challenges leather's role in shoes. Shoe industry sales will surpass the 600-million-pair mark this year; and with rising incomes and increased population, output should rise steadily.

Undoubtedly the leather finishes market will continue to grow, but specialty makers should look closely before leaping in. The industry has some long-established buying habits that may well trip up the uninitiated. To sell a tanner a finish for instance, you don't use a leather finish jobber; you sell direct. And it's often necessary to put a salesman into the tannery who can roll up his sleeves and formulate a finish on the spot, run off a horse (about 50) of sides as if he were part of the tanner's regular production crew. And since a tanner seldom buys a one-package deal, much of the time producers must be content with supplying only one component of a finish.

Unless a specialty maker is prepared to get into an industry that expects a lot of service, it should avoid the leather finish field — or else sell to a finish house that will, in turn, sell the tanner.

The leather field wants and needs new and novel finishes. A general hike in leather prices is in the offing, and leather makers will be willing—and better able — to pay for the finishes that can help them promote leather as a quality item.

Potent Pool Purifier

A new swimming pool germicide said to eliminate the sting associated with some methods of sterilization has been introduced by Gallowhur Chemical Corp. (Ossining, N.Y.). The product, called D.I.P., is an iodide derivative, comes either as a white powder (added to pool scuppers), or as a pill (put directly into the water). Approximately 3 oz. of the compound is claimed to be enough to maintain aseptic conditions in 20,000 gal./day of water.

Bleaching effects, e.g., discoloration of dyed hair, fabrics, decoloring, and eye irritation—disadvantages of some compounds now in use, are said to be eliminated with the new germicide.

Two-in-One Varnish

Union Carbide Chemicals has developed a coating said to have the adhesion and alkali-resistance of epoxy ester varnishes plus the light stability of alkyd varnishes. Starting material for the light-stable coating is UCC's Epoxide 201. It's free from the light-sensitive ring structures of conventional epoxy resins, but has the epoxide groups that allow it to form chemically resistant polyether polymers.

On a metal test panel, the new coating not only showed the same impact- and alkali-resistance of a conventional epoxy oil-modified coating but also withstood more than a month's ultraviolet-light exposure without apparent change in color, gloss or hardness.

Bristol Buys Clairol

Bristol-Myers Co. (New York) is now in the hair colorant business as a result of purchase of Clairol, Inc. (offices in New York; plant in Stamford, Conn.). According to Bristol, Clairol will become a separate subsidiary, and Clairol's present personnel, including management and sales force, will all be maintained by Bristol under the new setup. "The only difference in Clairol's operation is that it's now a Delaware, not a Connecticut, corporation," says a Bristol official. Clairol is No. 1 in sales of hair colorants to beauty salons (hair coloring was a $16-million beauty-parlor business last year) and is moving up fast in sales of retail hair colorants—a $42-million market in '58.

New Fruit-Label Law

The Food and Drug Administration is now completing its plans to establish a new labeling law for synthetically sweetened fruits. Under the new standard, the words "artificially sweetened" will appear on the label as part of and ahead of the name of the fruit. The new ruling will become effective in about three months (unless stayed by objections from parties adversely affected) and will apply to synthetically sweetened peaches, apricots, pears, cherries, fruit cocktail and figs.

Common name of the sweetener, its percentage by weight, and the number of calories in an average serving of the canned product also will be required under the new sweetener labeling.

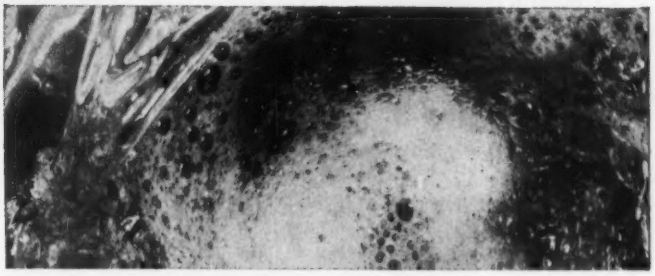
Carpet Cleanup

Electrolux Corp. (New York) reports that it will soon be selling an air-powered rug-washing attachment and shampoo dispenser. And Electrolux, like Bissell Carpet Cleaner Co. (Grand Rapids, Mich.), isn't entering the do-it-yourself business without the aid of a chemical rug-cleaning product. The company will sell Turbo, a concentrated (it's diluted 1:8 before use) liquid rug shampoo, along with its attachment. Packaged in a 10-oz. polyethylene bottle, Turbo will retail for $1.95—enough to clean three or four normally soiled 9 x 12 rugs, says Electrolux. The new attachment, designed to fit any model Electrolux vacuum cleaner, costs $26.75. Like all other products made by Electrolux, both the chemical cleaner and the attachment will be sold only by Electrolux's door-to-door salesmen. Electrolux's entry in the carpet-cleaning business could boost sales of rug-cleaning compounds substantially (*CW, April 4, p. 57*). According to one Electrolux spokesman, "Specialty makers will soon have to think of rug-cleaning compounds as a $40-million —rather than as a $20-million/year—business."

Milestones In Hydride Chemistry

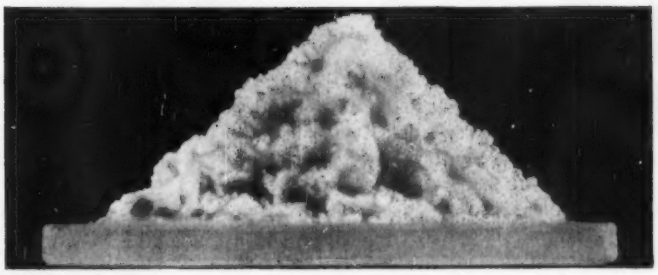
BOROHYDRIDE APPLICATIONS SPREAD AS MHI EXPANDS PRODUCT FORM AVAILABILITY

SWS — Stabilized Water Solution, a new form of sodium borohydride available in commercial quantities at a price less than half of the pure material. Sodium Borohydride-SWS is a stable, aqueous caustic solution. The sodium borohydride content is about 12 weight percent and is ideal for use in cleaning up small amounts of carbonyl and peroxides in organic products.



PELLETS — now, both sodium borohydride and potassium borohydride are available in smooth, crowned pellet form. Simplifying handling and eliminating dust, pelleted borohydrides open applications for continuous fixed-bed, in-stream carbonyl group and peroxide reductions. Size availability include 10/32″ and 24/32″ diameter pellets.

PURE POWDER —98% pure sodium borohydride and 97% pure potassium borohydride, both white crystalline solids, are remarkably stable and easily used with complete safety in standard equipment. For convenience of use both are shipped in polyethylene-lined cans or drums.



MHI Technical Service will gladly provide complete information concerning the new borohydride forms as well as qualified assistance in applying them to your process.

Write for MHI's new publications, "Sodium Borohydride, Potassium Borohydride, Manual of Techniques", and "Selective Reductions of Organic Compounds with Complex Metal Hydrides."

CHEMICAL HYDRIDE DIVISION

Metal Hydrides Incorporated

PIONEERS IN HYDRIDE CHEMISTRY

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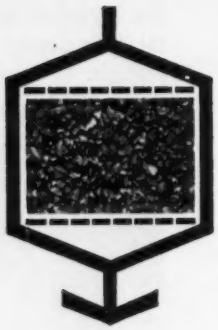
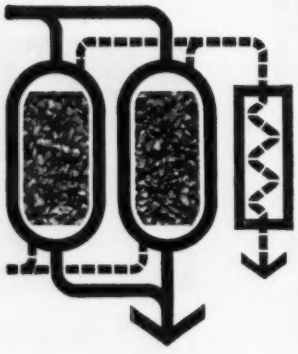
ACTIVATED CARBON

purifies liquids and gases; eliminates tastes, odors, chlorine, and a wide range of contaminants from liquids and solutions. Decolorizes and deodorizes liquids. Raises the standards of purity for many industrial gases. Removes undesirable impurities. Permits recovery, re-use, or resale of by-product gases. Effective for difficult gas separations. Save on heating and cooling by recirculating air through activated carbon filters. Improve comfort and safety in living and working spaces.



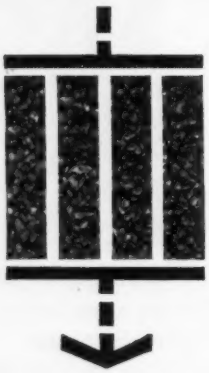
ACTIVATED CARBON

recovers solvents at a fraction of the original cost. Activated carbon adsorbs solvents from air. Helps improve products by making the best solvents economical to use. We engineer and build complete solvent recovery systems in addition to supplying bulk activated carbon. Stops pollution, removes contaminants from exhaust air or liquid effluent. Recovers by-products.



ACTIVATED CARBON

catalyzes and serves as a catalyst support. Speeds oxidation-reduction reactions, chlorinations, and hydrogenations—the key to vinyl chloride production. We supply all grades of activated carbons made to strict quality standards and provide prompt regeneration service. Barnebey-Cheney, Columbus 19, Ohio.



Write for Literature Group J-46.

Barnebey Cheney

SPECIALTIES

Answer Man

Trying to track down a trademark in the chemical field? A newly established service organization, Cheminform Institute, might be able to help you. The institute (10 Columbus Circle, New York) says its purpose is to quickly get (for a fee) definitions and other information on terms for chemicals and processes that may not be given in readily available dictionaries and similar reference sources. The service covers technical words and trademarks used in the U.S. and in foreign countries. The company will also offer a trademark-coining service. Harry Bennett, editor-in-chief of the "Chemical Formulary," is director of the institute.

Hot Item in Antifreezes

The U.S. motorists' demand for cooler summer driving has helped bolster sales of glycol antifreeze. The increase has come through sales to automakers who install air conditioning units that contain the permanent type of antifreeze. Estimates are that about 8% of the '58 models were equipped with air conditioners, and it's predicted that this figure will climb to 15% by '60.

Odorless Vitamin B

Mead-Johnson (Evansville, Ind.) will this month introduce a tasteless and odorless form of the three B vitamins in several of its soluble vitamin tablets. The tasteless form is produced by enveloping microscopic pellets of the active vitamin salts in a special fatty acid derivative. Products using the new form of vitamins are M-J's Poly-Vi-Sol and Deca-Vi-Sol.

EXPANSION

Morningstar-Paisley: Morningstar-Paisley Inc. (New York) has unified the operations of two previously distinct groups into one department, now has a new Gum and Technical Products Dept. The new unit will coordinate all technical activities dealing with gums and other specialties from the customer service standpoint at both the product development and product application levels. Thomas Morningstar is general manager. Mark Malkovich is the sales manager.

Beautiful specimen of Nature's handiwork: Sulphur Crystal embedded in the matrix of limestone and calcite crystals recovered from a drill core taken hundreds of feet underground while exploring a Sulphur deposit. (Ektachrome by Keturah Blakely)

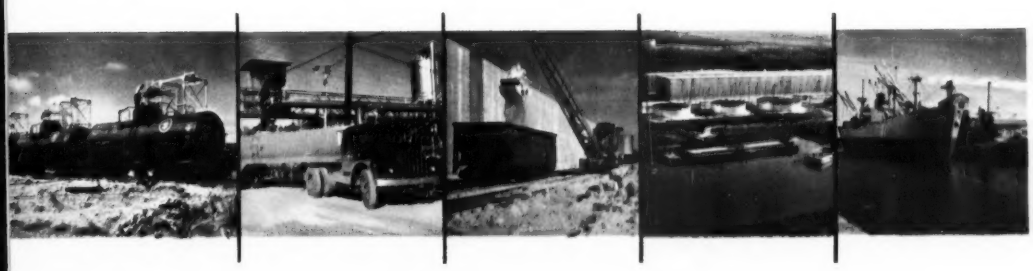
from the company that is Staffed, Equipped and Stockpiled for Service

Solid Sulphur by Rail, Barge, or Ship

Molten Sulphur by Rail, Truck or Barge, from Mines or Strategically Located Terminals

Technical Service on problems involving the Use and Handling of Sulphur

SULPHUR



from left to right:
Loading Tank Cars with Molten Sulphur
Loading Tank Trucks with Molten Sulphur
Loading Gondolas with Solid Sulphur
Loading Barges with Molten Sulphur
Loading Freighters with Solid Sulphur

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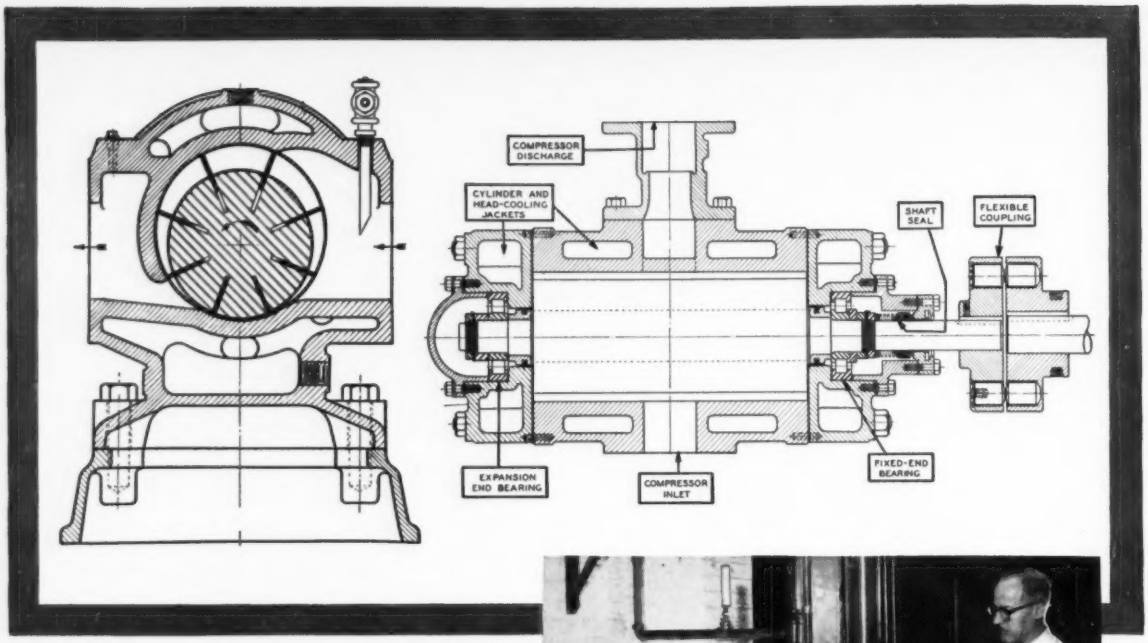

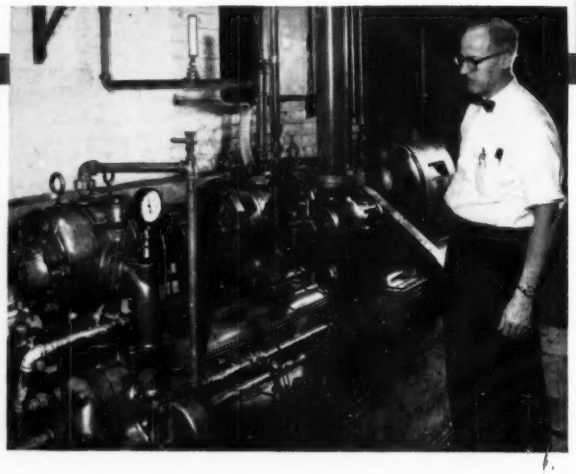

Hard service never affected this Fuller rotary's original output—230 cfm. of air at 90 lb. G., reports Mr. Schott, chief engineer, Thomas C. Wilson, Inc., Long Island City, N.Y.

FULLER ROTARY COMPRESSOR RUNS 13 YEARS WITHOUT DOWNTIME

A Fuller rotary at Thomas C. Wilson, Inc. got its first maintenance shutdown recently, for renewal of roller bearings and rotor vanes—after running without downtime since 1945.

4 years of 24-hour service. The Wilson plant makes tube cleaning equipment, tube expanders and portable pneumatic tools, and so makes heavy daily demands on shop air. For the first four years, three-shift operation kept the Fuller rotary running round the clock. Since 1949, it's been working eight-hour shifts.

Simple design means trouble-free service. Besides bearings, the only moving parts in a Fuller vane-type rotary compressor are the cylinderical rotor and the blades. These compensate for wear automatically. Cylinder head slips off, permitting blade and bearing inspection in a matter of minutes.

Compact and vibration-free. Direct-drive system saves space. Simple, rugged design gives constant service without extensive supervision. Thus, Fuller rotaries can be installed out-of-the-way—on upper floor, on balconies, in basement corners, using low-cost, light-weight foundations.

1189
C-340

Write today for detailed information on the full line of Fuller rotary compressors for in-plant services, gas gathering, and industrial refrigeration.

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PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

PRODUCTS

Soapers Book: The American Society for Testing Materials is just out with a new, 256-page book of ASTM Standards on soaps and other detergents. The volume contains 40 standards, 11 of which are new, revised or have recently changed status. Specialty makers may obtain the book from ASTM headquarters, 1916 Race St., Philadelphia. Cost: $3.50 each.

•

Organic Inhibitor: Amchem Products, Inc. (Ambler, Pa.), is offering Rodine 220, a new organic inhibitor for use with hydrochloric acid. Rodine 220 is said to protect steel and alloy steels against the acid at temperatures in the 200-300 F range.

•

Ozone Protector: Imperial Chemical Industries Ltd. is now marketing Nonox ZA, a rubber anti-ozone chemical, in the U.S. through its U.S. subsidiary, Arnold, Hoffman and Co., Inc. Nonox ZA (*p*-isopropylaminodiphenylamine) is said to protect both natural and synthetic rubber against ozone attack and flex-cracking. Biggest market target for Nonox ZA is the tire industry.

•

Rustproof Moly: Climax Molybdenum Co., division of American Metal Climax, Inc., suggests its sodium molybdate for use as a corrosion inhibitor in aqueous recirculating systems. To date, big drawback of using moly as a corrosion inhibitor has been its high cost. But Climax feels that it has solved the cost problem by mixing sodium molybdate with orthophosphate. The new corrosion inhibitor is formulated for use in refrigerator systems, cooling towers and jackets, antifreeze compositions, air-conditioning systems, boilers and diesel locomotives.

•

For Healthier Plants: Phaltan, a new fungicide chemically related to Captan, is now being marketed by California Spray-Chemical Corp. and Stauffer Chemical Co. According to the product's makers, Phaltan (N-trichloromethylthiophthalimide) controls some important plant diseases that Captan does not. Phaltan is now registered for some uses on ornamental plants, potatoes and citrus crops. Plant diseases that Phaltan is said to be effective against include black spot and

DANGERS of launching a NEW PRODUCT

Snell Research can help overcome them

Here's how, in some typical case histories of Snell clients:

Product Research and Development—A few years ago Snell was retained to develop new products, applications, and markets for sugar. Extensive research and development work by Snell resulted in the creation of a new synthetic detergent—based on *sugar!*

Product Application—A Snell client in the paper industry, for whom we had developed a fine additive, wanted to explore uses in other fields. Unfortunately, their highly qualified staff's experience was limited to the one field. Snell, with experts in practically every product field, found the new product has potentialities as both a good emulsifier and a paint plasticizer. Only the very largest manufacturing companies can duplicate the breadth of experience and background the Snell "brain-trust" of technical experts can offer you!

Product Improvement—One Snell client found their product, an adhesive bandage, slipping in quality. Tape was going gooey in storage on druggists' shelves. Snell research helped this client bring his product quality up to equal the best on the market, and retain his share of sales.

Product Evaluation—A Snell brewery client wanted to expand production and take advantage of a more efficient production technique but feared the taste of the beer might suffer. Snell food technologists, taste panels, and engineers checked the new process and hundreds of samples of beer made under new and old systems, recommended the switch to the more profitable modern process. The change went unnoticed by the customers, and sales continued to climb.

Market Research—A Snell client with a waste product had briefly considered building a plant to use it to manufacture another product; but had given up after their own brief survey showed the new product to be already overproduced. When they consulted Snell for checking, however, Snell predicted there would be a shortage within three years. The client waited two years, built the plant—and now has a profitable new product instead of a waste!

Toxicology—One of the largest frozen food companies began getting complaints on the flavor of one of their green vegetables. Since hundreds of thousands of dollars were at stake, they consulted Snell to find out what was wrong. Snell by analyzing tests, and checking on the farm, was able to prove that the taste—actually toxic—was due to a new type of insecticide sprayed on the fields hundreds of yards away on a windy day long before the harvest!

Engineering—A large midwestern firm desired to produce its own brand of instant coffee, to possess outstanding flavor, body, and bouquet. They engaged Snell to handle all details, from design to engineering, to supervision of actual process startup. The fine qualities "built into" this resultant product made it such a success that Snell was commissioned to enlarge the plant, which has recently gone into production.

What's Your Product Problem?—Whatever it is, and whatever your product field—chemicals, chemical specialties, personal products, pulp and paper, protective coatings, plastics, textiles, foods, petroleum, rubber—Snell has men who "know the score" in that field, and who can work with you creatively and profitably in developing, producing, protecting, and marketing new ideas. This broad experience can be decisive in protecting not only your ideas, but also the thousands of dollars you spend developing them. And the cost of Snell service is less than you might imagine! Half the jobs we do cost less than $1000!

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powdery mildew on roses; leaf spot on chrysanthemums; early and late blight on potatoes; citrus scab and melanose on citrus fruit.

•

Yellow for Cellulosic Fibers: The Dyestuff Division of Geigy Chemical (Ardsley, N.Y.) is offering a new yellow dyestuff, particularly recommended for cellulosic fibers. It's called Diphenyl Brilliant Flavine 7GFF, has a distinct fluorescent cast and is said to have greater brilliance than any other direct yellow dyestuff on the market. The yellow has a light-fastness rating of three on both rayon and cotton.

•

Self-Powered Spray Gun: Sprayon Products (Cleveland) has developed a self-contained spray gun powered by a replaceable can of proponent gas. It's called Jet-Pak, sells for $4.95.

•

Slimicide: A new mercury-based slimicide for use in the paper industry is being marketed by Metalsalts Corp. (200 Wagaraw Rd., Hawthorne, N.J.). The product is chemically a diphenylmercuric ammonium propionate in which the phenylmercury is bound in a quaternary-type nitrogen complex. In liquid form, the compound is tradenamed Metasol-L; in solid form, Metasol-P.

•

Lead Putty: A puttylike material made up of 94% lead and 6% plastic is a new product by Devcon Corp., (Danvers, Mass.). It bonds lead, steel, aluminum, bronze, brass, wood, iron, porcelain and other materials to themselves or to each other. It's tradenamed Devcon L, is available in 1-, 4- and 25-lb. containers.

•

New Color for Poly: Sherwin-Williams Co. (Cleveland) has introduced fluid toner colors for polyester resins. The color bases are dispersed in a reactive monomer and S-W claims they are easier to pour into a resin mix than color pastes because their viscosity is lower. Lumping—and filtering — are eliminated. Amounts of the color required for unfilled laminates range from 0.1% to 0.5%. Formulations containing fillers may require 1 to 10%. Available colors sold in quart, gallon and 5-gal. containers, are black, orange, blue, gray, green, brown, red, turquoise, yellow and white.

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SLURRIES...
and 7 reasons why SHARPLES SUPER-D-CANTERS are preferred in the PROCESS INDUSTRIES...

① **SIX SIZES.....WIDEST CAPACITY RANGE**

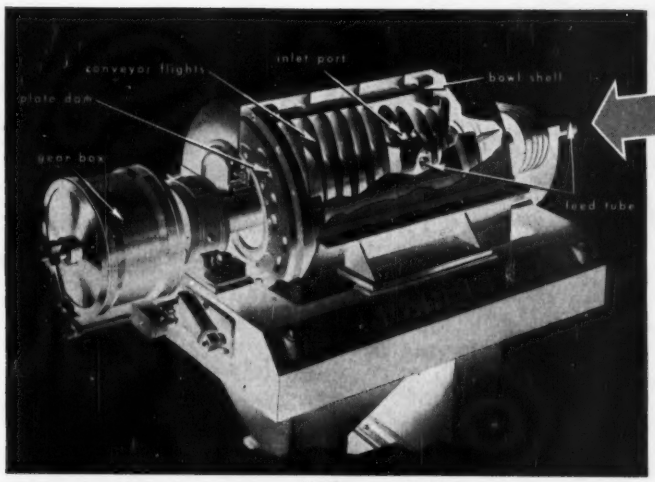
Solids Handling Capacity from a few lbs./hour to 3,000 lbs. or more lbs./hour in horizontal Super-D-Canters—up to 10-15 tons/hour in vertical Super-D-Canters.

Liquid Handling Capacity from a few gal./hour to 7,000 or more gal./hour in horizontal Super-D-Canters—up to several hundred gal./minute in vertical Super-D-Canters.

② **SLURRIES OF ½%** or less to 50% or more solids concentration can be clarified or dewatered continuously with high efficiency. Moistures as low as 1% can be obtained depending upon characteristics of the feed slurry.

③ **AMORPHOUS and CRYSTALLINE SOLIDS** in the size range from a few microns up to relatively large particles are being processed efficiently.

④ **BROAD RANGE OF MATERIALS HANDLED**—from basic inorganic and organic chemicals such as alkali, reaction chemicals and polymerized plastics, to fruit and vegetable juices, edible and inedible tallow and lard, to high energy fuel components.



Four Models of horizontal Super-D-Canter and 2 vertical Models to continuously remove solids from slurries and suspensions; recover, dewater and wash fine crystals and other solids; and clarify solids suspended in liquids.

Continuous solids discharge

Clarified liquid

⑤ **MODELS FOR PRESSURE OPERATION** to 150 psi, as required.

⑥ **HIGH CENTRIFUGAL FORCE** (to 3200 x gravity) effects greater separating capacity in a given area than is possible with lower centrifugal force.

⑦ **TESTS, PILOT PLANT OPERATIONS,** and small production on the P-600 Super-D-Canter—performance can be scaled up directly to the larger models.

Many hundreds of Super-D-Canters in service are proving daily how Sharples can help you make more profits from your slurries. Sharples trial, test, and laboratory facilities are unequalled for solving your problems.

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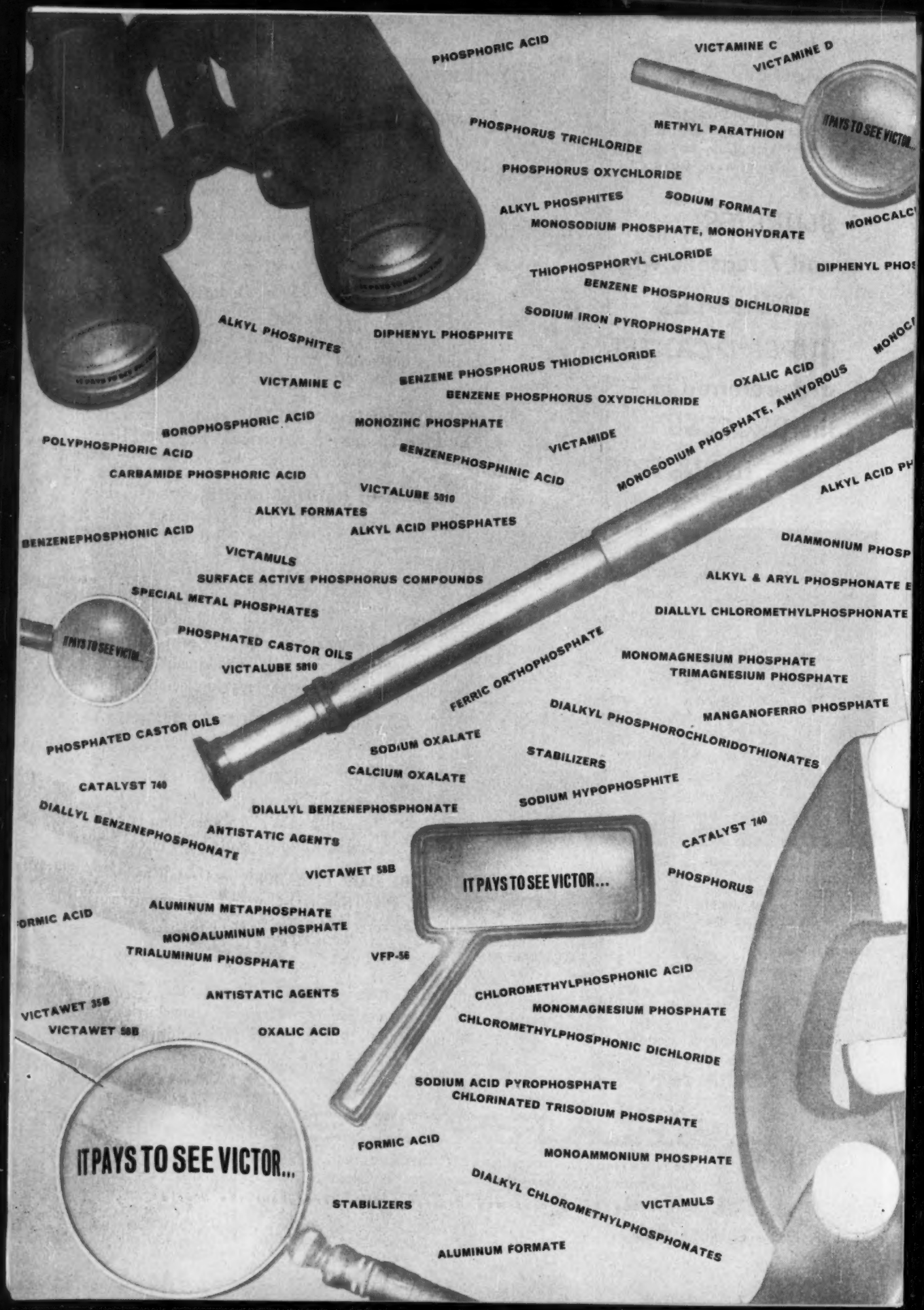
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VICTAMINE C
VICTAMINE D
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METHYL PARATHION
PHOSPHORUS TRICHLORIDE
PHOSPHORUS OXYCHLORIDE
ALKYL PHOSPHITES
SODIUM FORMATE
MONOSODIUM PHOSPHATE, MONOHYDRATE
THIOPHOSPHORYL CHLORIDE
DIPHENYL PHOSPHITE
BENZENE PHOSPHORUS DICHLORIDE
SODIUM IRON PYROPHOSPHATE
ALKYL PHOSPHITES
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BENZENE PHOSPHORUS THIODICHLORIDE
VICTAMINE C
OXALIC ACID
BENZENE PHOSPHORUS OXYDICHLORIDE
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BOROPHOSPHORIC ACID
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POLYPHOSPHORIC ACID
VICTAMIDE
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VICTALUBE 5810
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MONOMAGNESIUM PHOSPHATE
TRIMAGNESIUM PHOSPHATE
DIALKYL PHOSPHOROCHLORIDOTHIONATES
MANGANOFERRO PHOSPHATE
PHOSPHATED CASTOR OILS
SODIUM OXALATE
STABILIZERS
CALCIUM OXALATE
CATALYST 740
SODIUM HYPOPHOSPHITE
DIALLYL BENZENEPHOSPHONATE
ANTISTATIC AGENTS
DIALLYL BENZENEPHOSPHONATE
CATALYST 740
VICTAWET 58B
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PHOSPHORUS
ALUMINUM METAPHOSPHATE
MONOALUMINUM PHOSPHATE
TRIALUMINUM PHOSPHATE
VFP-56
CHLOROMETHYLPHOSPHONIC ACID
ANTISTATIC AGENTS
MONOMAGNESIUM PHOSPHATE
VICTAWET 35B
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VICTAMULS
ALUMINUM FORMATE

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OFERRO PHOSPHATE

PHOSPHORIC ANHYDRIDE

PHOSPHORUS PENTASULFIDE

MONOZINC PHOSPHATE

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SPHATE

OPHOSPHATE

PHOSPHATE

PHOSPHATE

TETRAPOTASSIUM PYROPHOSPHATE

SSIUM PHOSPHATE

MONOPOTASSIUM PHOSPHATE

DISODIUM PHOSPHATE, ANHYDROUS

DISODIUM PHOSPHATE, DUOHYDRATE

RATE

CALCIUM OXALATE

DRATE

ALUMINUM FORMATE

SODIUM HYPOPHOSPHITE

SODIUM FORMATE

PHOSPHORUS HEPTASULFIDE

PHOSPHORUS

FERROPHOSPHORUS

SODIUM OXALATE

ETHYLENEDIAMINE TETRA-ACETIC ACID

SODIUM TRIPOLYPHOSPHATE, ANHYDROUS

SODIUM TETRAMETAPHOSPHATE

VITRAFOS

IT PAYS TO SEE VICTOR...

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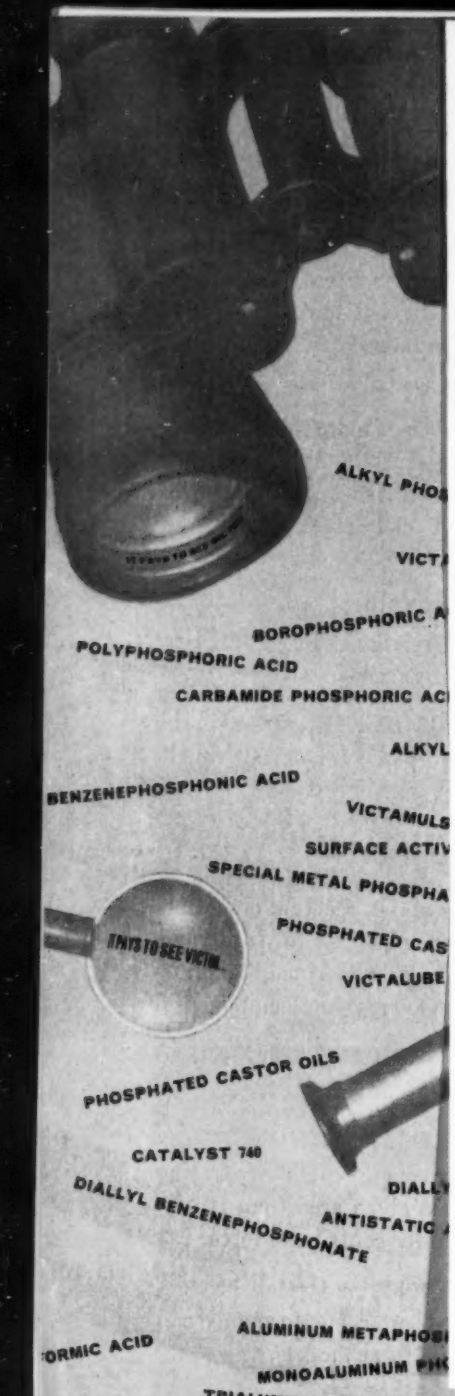
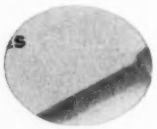


this much research...

For 61 years, Victor chemists, and other professionally trained scientists have devoted much of their time to investigating and developing entirely new families of phosphorus derivatives.

At Victor's research labs, people are never willing to let well enough alone (some of our *best* people, too). As a result, the number of compounds discovered through Victor research is virtually beyond counting.

What you *can* count on though, is Victor's versatile organophosphorus productive capacity. These facilities are at your beck and call—as is our chemical know-how — to produce pilot plant and commercial quantities



of a long list of organophosphorus compounds. Or, if you have need for some seemingly unrelated product, we would welcome the opportunity to discuss it with you.

There's no obligation when you send for a list of our newest organophosphorus derivatives. Just fill in the coupon on the back page and mail it to: Victor Chemical Works, Box 271, Chicago 90. You'll see why many research men say, "It *pays* to see Victor."

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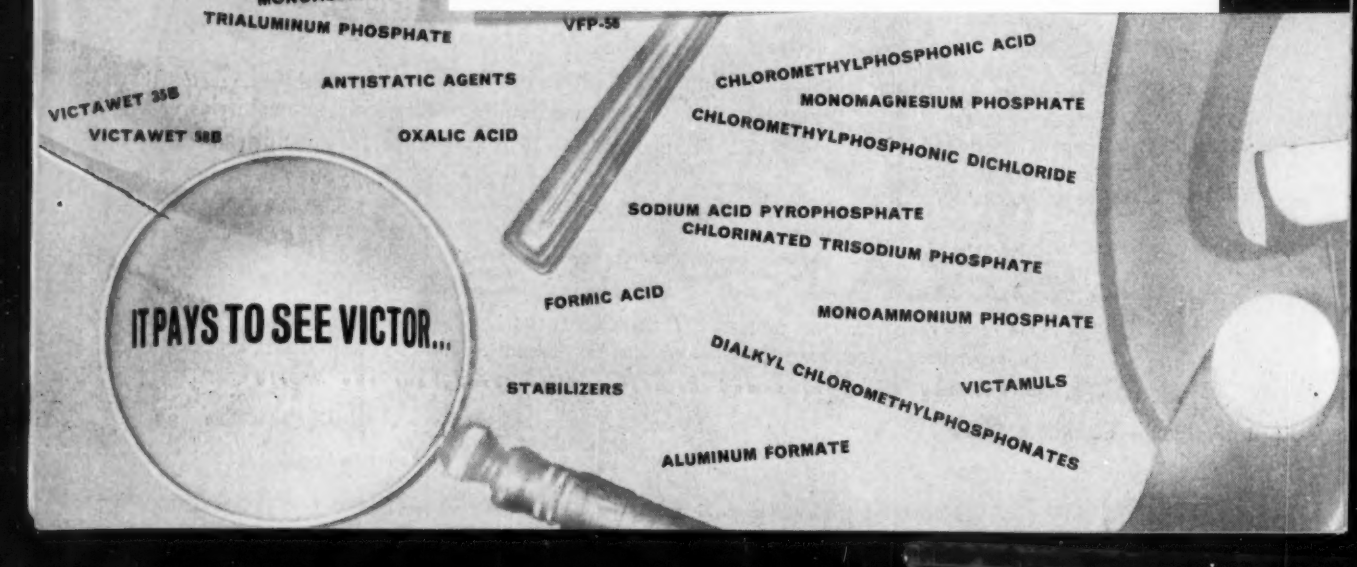

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SPECIAL METAL PHOSPHATES

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SPHATE

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PHOSPHATE

PHOSPHATE

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RATE

CALCIUM OXALATE

DRATE

TETRASODIUM PYROPHOSPHATE, ANHYDROUS

ALUMINUM FORMATE

SODIUM HYPOPHOSPHITE

SODIUM FORMATE

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PHOSPHORUS

FERROPHOSPHORUS

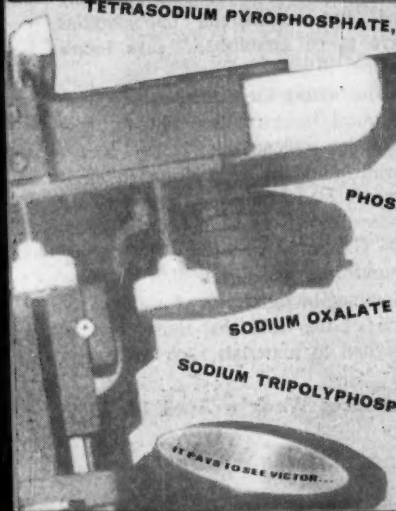
SODIUM OXALATE

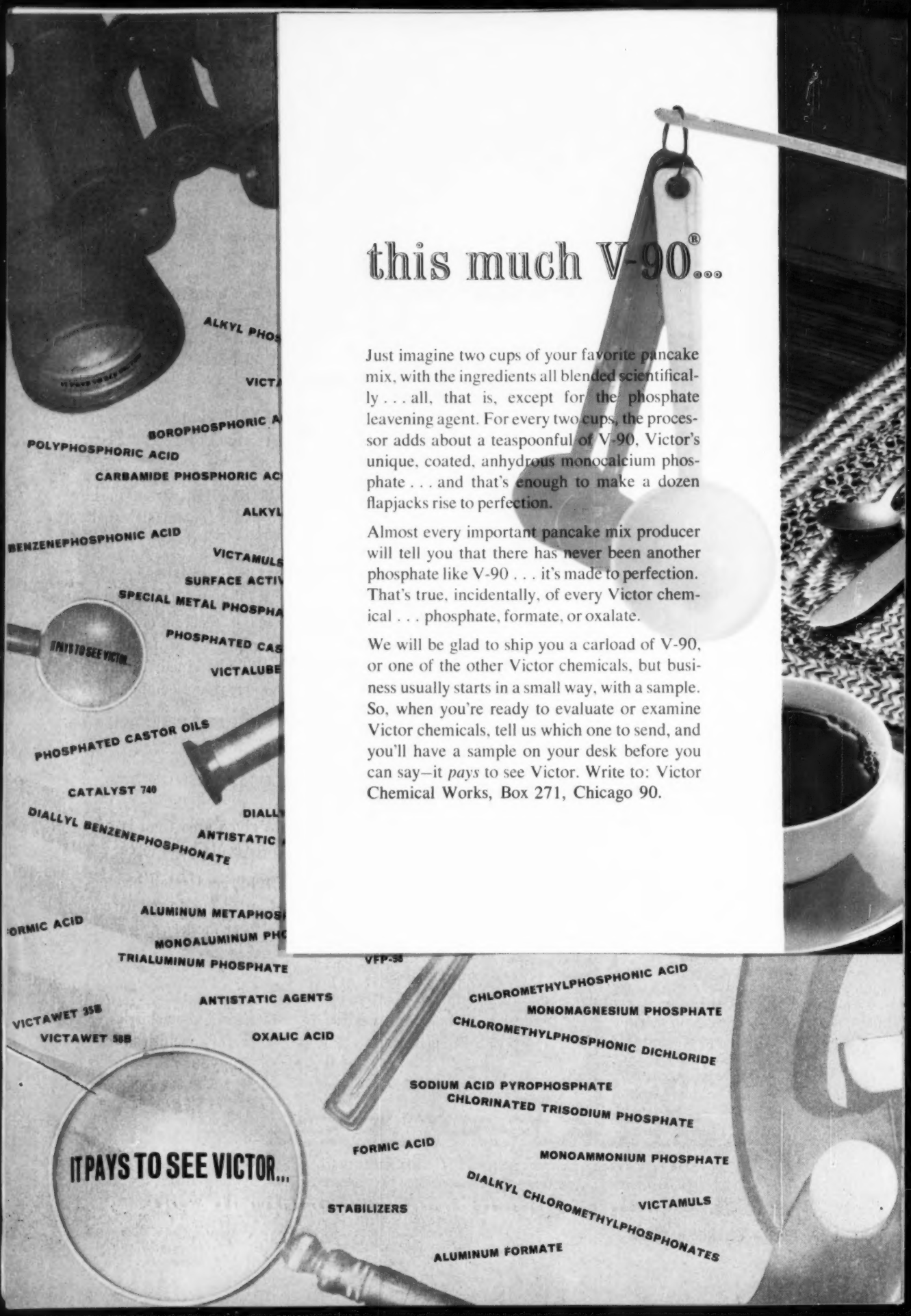
ETHYLENEDIAMINE TETRA-ACETIC ACID

SODIUM TRIPOLYPHOSPHATE, ANHYDROUS

SODIUM TETRAMETAPHOSPHATE

VITRAFOS





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SODIUM TRIPOLYPHOSPHATE, ANHYDROUS

SODIUM TETRAMETAPHOSPHATE

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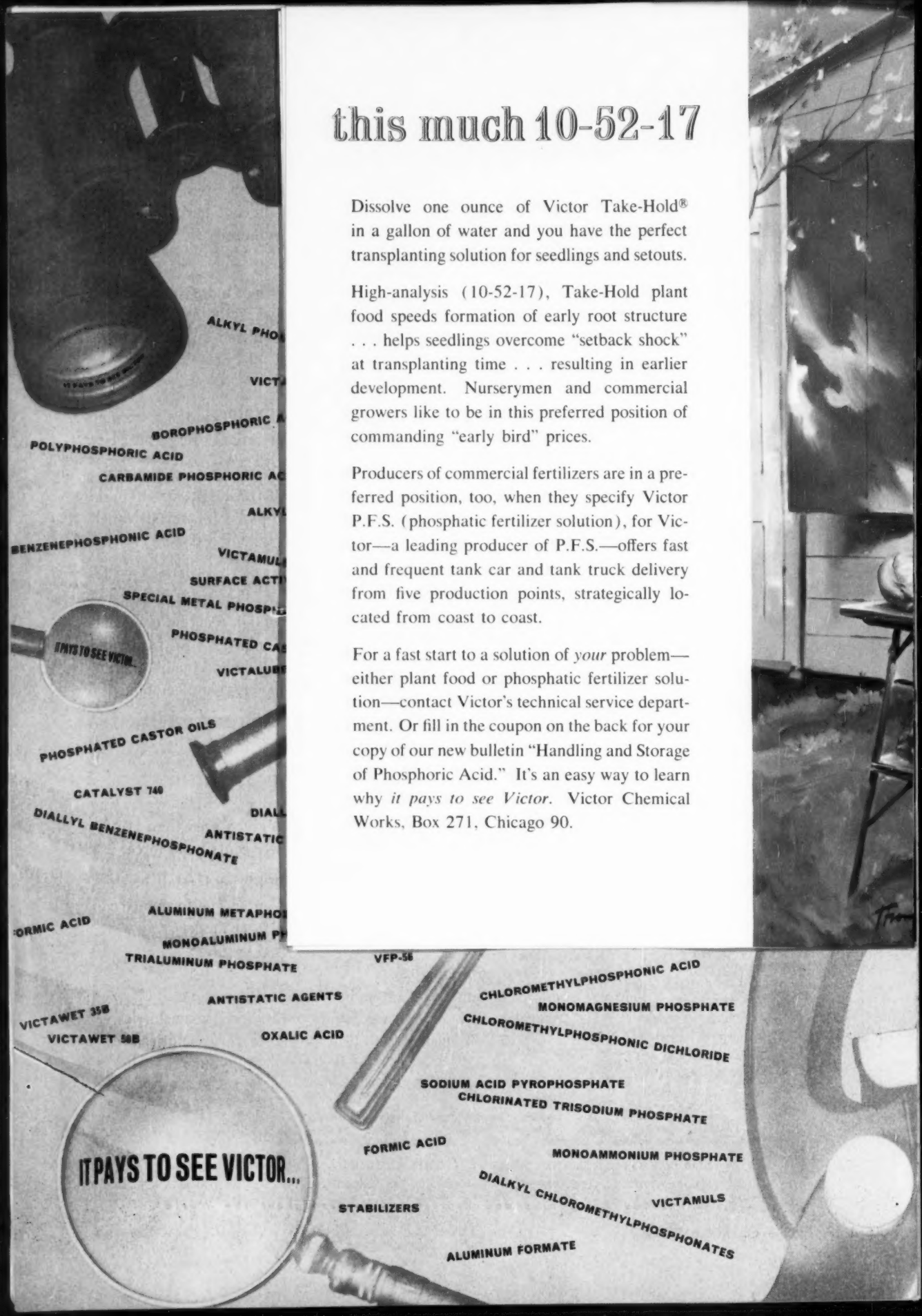

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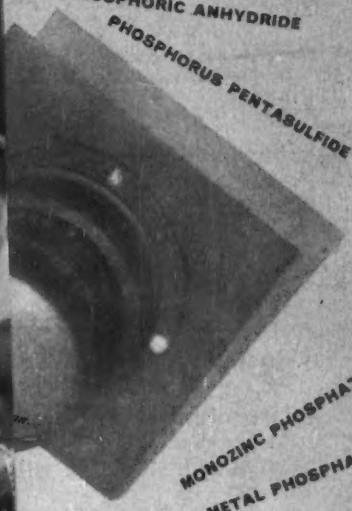

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SODIUM TRIPOLYPHOSPHATE, ANHYDROUS

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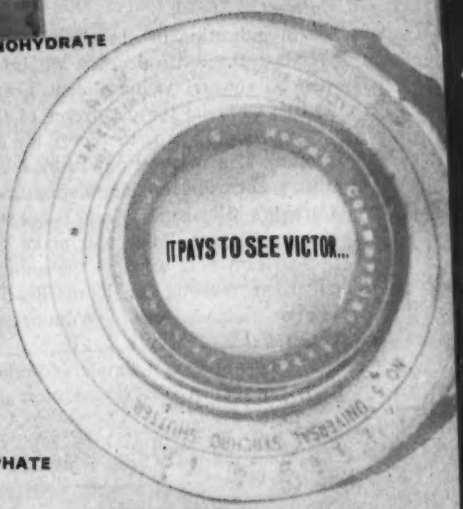

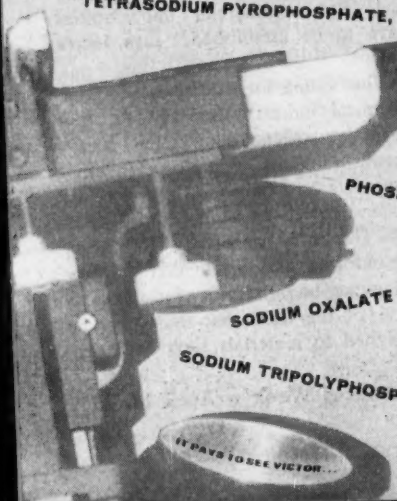

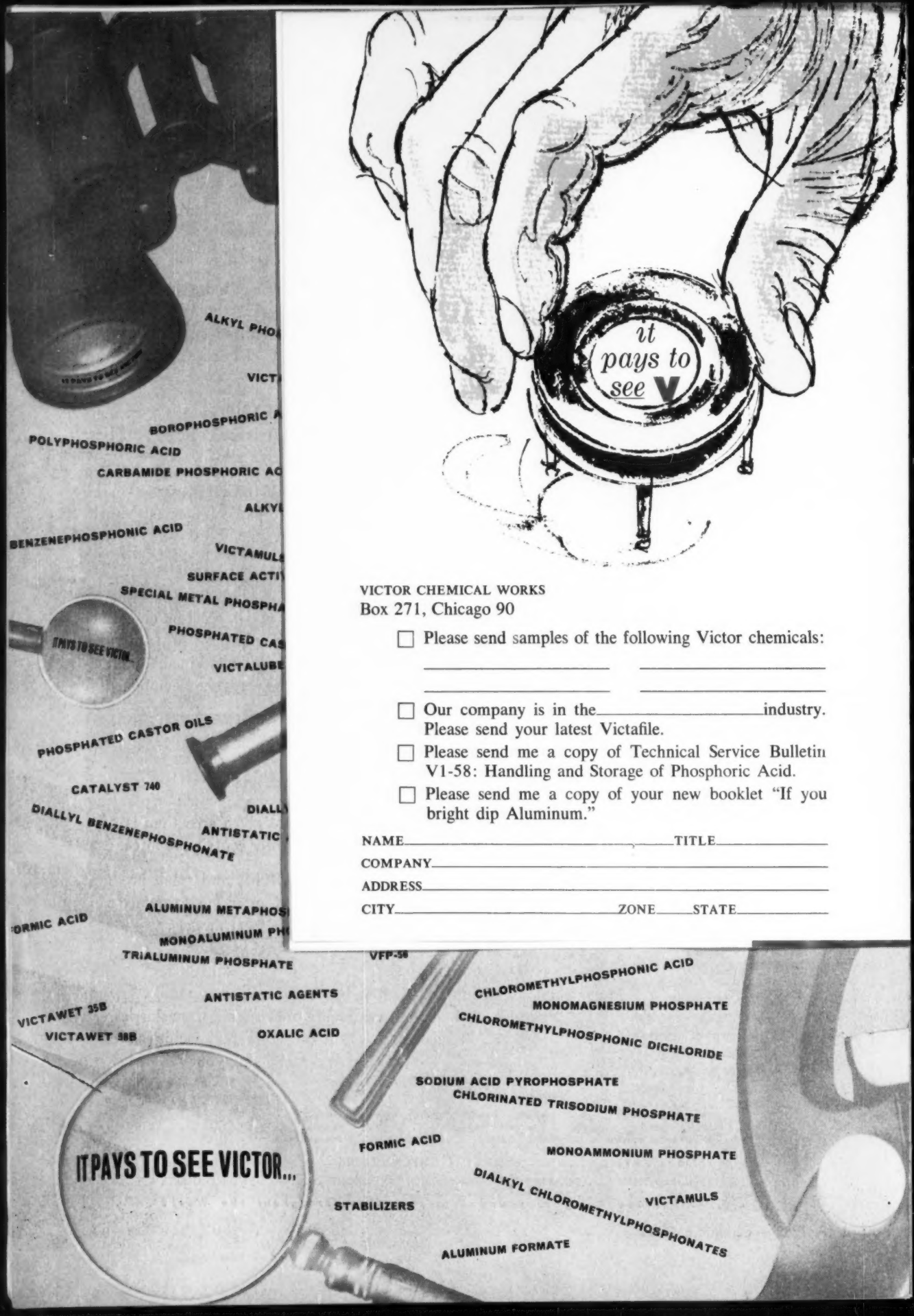

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New Alloy Licks Top Corrosion Troubles

With fingers crossed, Union Carbide Metals Co. is awaiting reaction to its official unveiling early this week of a new titanium alloy with improved corrosion-resistance (CW Technology Newsletter, April 11, p. 84). Although hopes of lifting titanium sales out of the doldrums seem slim, there are high expectations that the newcomer will stir considerable chemical industry interest.

An indication of already-generated interest: the swift decision of International Nickel vice-president Frank LaQue to invite the discoverer of the alloy, Milton Stern, to report on his product at a meeting of chemical industry corrosion engineers. Stern, of Carbide's Metals Research Laboratories in Niagara Falls, will make his presentation next week at the annual corrosion meeting at Kure Beach-Harbor Island (near Wilmington, N.C.).

The new alloy is a simple and relatively inexpensive 0.1% addition of palladium to commercially pure titanium. The additive permits titanium's use in reducing environments where it could never before have been used—for example, in strong reducing acids such as sulfuric and hydrochloric. The chart (*above*), which lists materials in order of decreasing resistance to strong acids and chlorides, shows the alloy's high ranking.

Theoretical Scale-Up: The new alloy is a result of sound fundamental research, says Carbide, and it has no reason to believe that its laboratory results will not be borne out. The fundamental work concerned electrode kinetics in electrochemical systems. According to Stern's theory, a noble metal,* when added to titanium, creates a bielectrode or galvanic couple at the surface of the alloy. The couple serves as a site with low hydrogen overvoltage, results in passivity and lower corrosion rate.

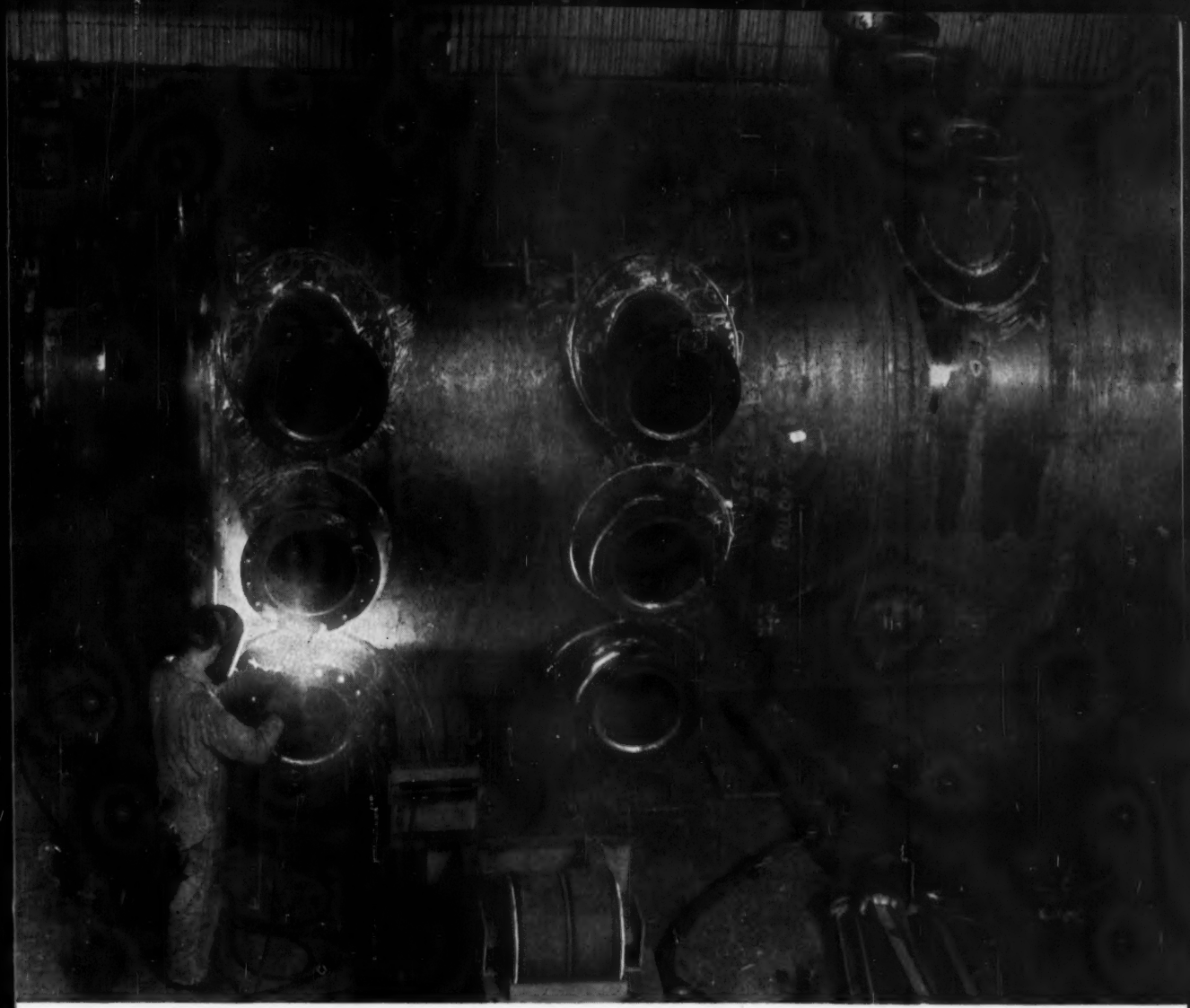
*Carbide picked palladium rather than other metals such as platinum, rhenium, rhodium and gold because of its lower cost.

Similar work with noble metals has been carried out by others. The Russians have alloyed platinum and palladium with stainless steel. But Stern and coresearcher Claude Bishop found that noble metal alloying is most effective with titanium.

"From a technical standpoint, it is a fine piece of work," says Lee Bush, director of research at Mallory-Sharon Metals.

"The technical merit is obviously real. But commercial opportunities have to be established," says Inco's LaQue.

Fluctuating Environments: To what chemical industry uses can the new reduction-resistant alloy be put? It may permit titanium to perform in environments now only partly serviced by materials such as Monel and Hastelloy C. And, according to Stern, laboratory tests indicate that the new alloy may be satisfactory for about 30-40% of the tasks that must now be assigned to materials such as expen-



The Business End of a Big New Vessel for DOW Petrochemicals

An expanding petrochemical plant at The Dow Chemical Company in Bay City, Michigan called for an interesting two-part processing unit—a quench water tower and a quench water tank. Designed by Bechtel for the new plant now under construction by The Austin Company, this unit was awarded to Graver for fabrication.

This petrochemical unit for Dow is one of many types of both shop-built and field-erected processing equipment which Graver fabricates for the growing petrochemical, chemical and petroleum industries. In Graver's century of experience you will find the most modern fabricating and research techniques for the processing equipment you require.

Fabricated from ASTM A-285 GC Fire Box Quality Steel in accordance with ASME code standards, the tower was shop-built and the tank field-erected. The tower was constructed to withstand a design pressure of 15 psig, the tank, 3 psig. The design temperature provided for by the tower is 650°, by the tank, 200°. All welding was spot radiographed. Before leaving the shop, the tower was sandblasted and painted with one coat of lead chromate primer.

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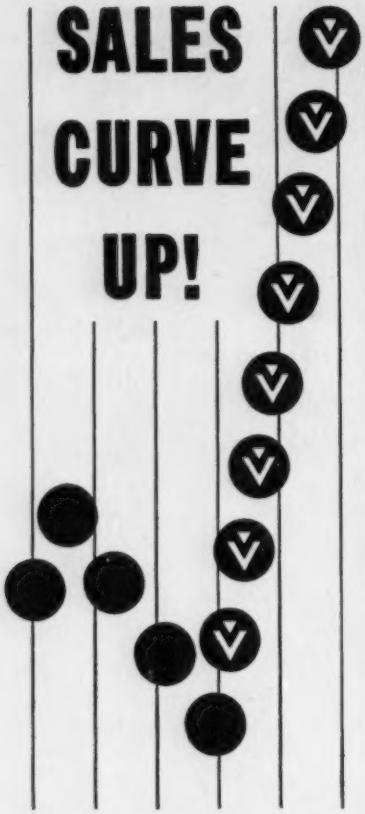
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sive zirconium, or Hastelloy B, good only in reducing atmospheres.

But another aspect is even more important, according to Stern. The new alloy is now qualified for use in environments that fluctuate between oxidizing and reducing. For example, Stern cites cases of Hastelloy B failure in reducing environments where the real cause of failure can be traced to the unsuspected presence of oxidizing agents.

Only very costly tantalum, and to a partial extent Hastelloy C, have coped with this type of failure in strong acid-chloride environments. With chlorides absent, Inconel, Monel, Carpenter No. 20 alloy and zirconium will also stand up to some fluctuating oxidizing-reducing conditions (*see lower rankings on chart*).

Field Tests: To see just how well the new alloy substantiates laboratory findings in actual plant atmospheres, plans have been made to add it to the second round of Columbia-Southern Chemical Corp.'s extensive titanium and zirconium corrosion-test program at its Barberton, O., plant. First-round tests, reported at last month's National Assn. of Corrosion Engineers conference in Chicago, confirmed previously reported data (*CW, April 13, '57, p. 27*) with a few exceptions. In one case, titanium was found to resist sulfuric acid in concentrations up to 72% when the acid contained chlorine. Previous data showed resistance up to only 5% in pure acid.

But field tests such as Columbia-Southern's will go only part way toward confirming the laboratory-predicted areas of usage. The new alloy's use for actual plant equipment will likely follow the pattern set for most special metals—i.e., when other metals fail, try it and see.

Ward Minkler of Titanium Metals Corp. of America points out that ordinary titanium might have been expected to fail—in light of what was known at the time—in one process involving sulfuric acid. But when tried, it worked out all right, because unexpected inhibitors were present in the reducing acid. Ferric, cupric and chromic ions are among those that inhibit titanium in reducing atmospheres. And, in the presence of chlorine, sulfuric and hydrochloric acids—both strong reducers—won't corrode titanium readily because the chlorine changes the environment from reducing to oxidizing.

Cost—The Big Question: It is difficult to speculate on the number of processes having environments that fluctuate between oxidizing and reducing. But even if the number is great, titanium sponge and mill-product producers† don't look for the new alloy to fan the banked fires of present titanium sales.

It will take time for chemical companies to find potential applications. Once the applications are found chemical management won't be convinced easily that the cost of the new alloy can be justified, judging from present sales difficulties of unalloyed titanium. Many companies will buy process equipment made from less-expensive materials, pay replacement and higher maintenance costs, rather than spend extra money at the outset for long-lived titanium equipment.

The new alloy will send titanium costs in the wrong direction. While palladium is the least expensive noble metal that can be used for the alloy, at $19/troy oz., the 0.1% addition adds 28¢/lb. to the cost of titanium. Scrap losses, which can still run better than 50%, depending on the mill product, would push the cost of the addition higher.

But no additional fabricating costs would be likely. Unlike most alloying, the small palladium addition doesn't appear to harm or enhance the already none-too-attractive qualities that titanium fabricators have so far had to live with. Therefore, reasons Carbide, a cost rise of 28¢ (or even 40-50¢, allowing for scrap) adds relatively little to the $4-14/lb. now paid for various titanium mill products.

Costs on a per-pound basis don't tell the complete story, of course. Titanium's high strength-to-weight ratio often permits less material to do the job. For example, only 60% as much titanium on a weight basis gives strength equal to stainless steel.

But costs are still high. For example, ¾-in.-O.D., 0.065-in.-wall heat-exchanger tubing—a use where titanium seems valuable—would cost 2 to 4 times as much as stainless steel tubing. It would still cost more if the titanium tubing's wall thickness were reduced to 0.025 in. Titanium tubing is, of course, still considerably

†Although Carbide has applied for patents on noble-metal alloying of titanium, it is only a sponge producer, will license others to make the alloy.

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U.S.I. CHEMICAL NEWS

Apr. 24 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1959

Soluble Sodium Complexes Prove Valuable for Wurtz Reactions and Metalations

It has been found that some aromatic hydrocarbons will form highly reactive soluble complexes with sodium in certain "active" ethers. These complexes are very useful for carrying out many metalation reactions and condensations of alkyl and aryl halides (Wurtz reactions).

Among the hydrocarbons found useful are naphthalene, diphenyl, the terphenyls and anthracene. The "active" ethers include dimethyl ether, methyl ethyl ether, dimethyl ether of ethylene glycol and tetrahydrofuran.

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By proper choice of hydro-

Armed Forces Outline Still-Unsolved Chemical Problems; Call for Help

The National Inventors Council recently published a report titled "Inventions Wanted by the Armed Forces," discussing military needs for certain types of materials which cannot as yet be supplied for technological reasons. The report calls for the chemist's assistance in providing:

(1) waterproofing compound for gages that will be flexible from —20 to 140°F and bond to anything.

(2) metal-to-metal adhesive, good up to 600°F, with a shear strength of 2,500 psi minimum.

(3) adhesive for explosives which can be applied down to —40°F; hold a 2½-lb. block of explosive on a vertical square for 60 days, using about 15 sq. in. of block surface; support the block on a variety of dirty, wet or uneven vertical surfaces.

(4) easy method for growing large, single silicon crystals of uniform lifetime, resistivity and dislocation density.

(5) quartz crystal units in the 1-100 mc range, able to operate from —55 to 90°C without more than 5 ppm deviation from nominal frequency.

(6) method of making colored smokes which would reduce the present 80-90% dye loss due to decomposition.

Copies of the report can be obtained at no charge from the National Inventors Council, U. S. Dept. of Commerce, Washington 25, D.C.

New Process for HCl Said to Yield Economies

A preliminary German patent, DAS 1-035-626, claims that hydrochloric acid can be made very economically in a plant consisting of a single tower lined with graphite-based, corrosion-resistant material.

As described, the process consists of burning hydrogen and chlorine in a bell-shaped reaction chamber at the bottom of the tower. The resulting acid, as a gas, passes through slits in the chamber and travels up through an absorbent, noncorrosive packing. Water or dilute acid drips down, cooling the tower walls and the reaction chamber, and is concentrated at the same time.

Ethylene Is Basic Raw Material For Giant Chemical Complex

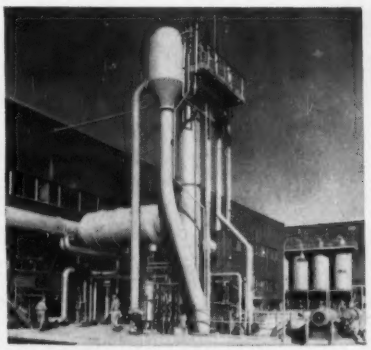
U.S.I. Uses Versatile Chemical 6 Ways: to Make Alcohol, Polyethylene, Ethyl Chloride, Ether; for Refrigeration In Its Own Manufacture; for Sale in Cylinders.

Ethylene is probably the most valuable petrochemical building block available to the CPI today. Almost four billion pounds were produced and used in 1957, and it is estimated that production capacity last year was about five billion pounds. At Tuscola, Ill., a huge complex of chemical plants — turning out a wide variety of large-volume products — has been erected on the foundation of a plentiful ethylene supply. Here, several natural gas pipelines from the Southwest join at a compressor station which feeds extraction and fractionation facilities. The ethane fraction from these facilities, converted to ethylene, becomes the "jack-of-all-trades" at the Tuscola complex.

The values of ethylene are its low cost and its ability to polymerize or react by addition with simple and inexpensive materials, such as hydrochloric acid, oxygen and chlorine, to yield extremely useful intermediates or end products. At Tuscola, ethylene is used for synthesis of polyethylene, ethyl alcohol, ethyl ether and ethyl chloride. A small portion is employed in the ethylene purification plant for refrigeration. It is also bottled under pressure in steel cylinders and sold as a ripening and conditioning agent for fruits and vegetables, as a chemical raw material, and as a refrigerant. (A new technical data sheet gives commercial specifications for U.S.I. refined ethylene, properties of the pure compound, and use data. Copies can be obtained upon request on company letterhead.)

100 Million Pounds of Polyethylene

Of the 500 tons of ethylene produced at Tuscola each day, a third is polymerized to polyethylene. Ethylene raw material for this process is brought to a very high purity in a separate step which employs the ethylene gas itself as a refrigerant. Converting ethylene to polyethylene requires two steps. The gas is compressed under extremely high pressure and pumped into the polymerization reactor, where it is held at high pressure and moderately high temperatures. A catalyst is added to start the reaction. The polyethylene formed flows to a separation system where unreacted gas is removed. Low and intermediate density resins are produced by this process at Tuscola's 100-million-pound-per-year polyethylene plant.



U.S.I. ethylene unit supplies 100-million lb.-per-year polyethylene plant at Tuscola, Ill.

Ethanol, Ether and Ethyl Chloride

Recycled ethylene, as well as fresh make-up from the ethylene unit, feeds into the ethyl alcohol facility where it is absorbed in sulfuric acid and then hydrolyzed under controlled conditions to yield 190-proof and anhydrous alcohol. This synthetic alcohol plant is among the country's largest and supplies alcohol raw material for a large segment of the American chemical industry. Ethyl ether is a by-product of the same process. In another plant, by reaction with hydrochloric acid, more ethylene is converted into ethyl chloride — sold for production of tetraethyl lead and other products.

Ethylene in cylinders is sold by U.S.I. for food processing, as a refrigerant, and as a chemical raw material.

Advantages of Integrated Production

The Tuscola operation could, if the demand arose, produce other ethylene derivatives such as ethylene oxide, ethylene dichloride and ethylene chlorohydrin. The integrated plant permits great economies in the production of all derivatives. Ethylene not used in making other U.S.I. products is sold in cylinders.

Over the last few years, as the market for polyethylene has soared, ethylene production capacity at Tuscola has been doubled. If activity within this integrated chemical complex is any indication, the demand for ethylene as a chemical building block should certainly reach and exceed the 6.5-billion-pound mark now being predicted for 1965.

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Apr. 24 ★ **U.S.I. CHEMICAL NEWS** ★ 1959

CONTINUED

Sodium

carbon and active ether, reaction conditions may be so chosen that no interference from the solubilizing components will be noted. The rate of formation of these soluble sodium carriers is much more rapid and complete with sodium dispersions than with massive sodium. Sometimes dispersions are made directly in these aromatic hydrocarbons.

A soluble complex will transfer sodium from the carrier to another organic compound with the regeneration of the hydrocarbon carrier. The hydrocarbon then promptly solubilizes additional sodium. Thus only a catalytic amount of hydrocarbon is required.

As an example of this very useful technique, bibenzyl in dimethyl ether can be prepared from benzyl chloride using a sodium dispersion solubilized in naphthalene and terphenyl. The reaction is demonstrated by the equation:

$$2\text{ø}CH_2Cl + 2\,Na \rightarrow \text{ø}CH_2CH_2\text{ø} + 2\,NaCl$$

benzyl chloride — bibenzyl

Details of this preparation are given in U.S.I.'s brochure "Sodium Dispersions," available on request.

Another interesting application of sodium complexes is the use of sodium and naphthalene for etching "Teflon" resin surfaces so that the "Teflon" resin can be bonded to other materials.

Experimental Fuel Cell Converts Chemical Energy Directly to Electricity

A compact, experimental gaseous fuel cell recently developed converts chemical energy from an external source into electrical energy directly and instantaneously. There are no heat engine losses, and so the cell has a theoretical 100% efficiency. In trial runs, a 24-volt cell was used successfully to light two 15-watt electric light bulbs.

The fuel cell contains electrodes and an electrolyte, and hydrogen and oxygen are used as the fuel gases. Hydrogen is catalytically ionized at the anode — releasing electrons to the external circuit — and reacts with ions in the electrolyte. Oxygen is ionized at the cathode — absorbing electrons from the external circuit — and reacts with the electrolyte to replace the ions used at the anode and to form water. As a result, electrons flow through the external circuit at a voltage characteristic of the chemical reaction—and light the lamps.

Polyethylene Reflector Used in Training Reactor

A small sub-critical reactor, with a core 10 inches in diameter by 14 inches long, is being used as a teaching aid at the University of Texas, to train future nuclear scientists in the use of radiation equipment and the characteristics of reactors.

The reactor uses two types of reflectors — polyethylene and graphite — with thicknesses varying from three to ten inches. During study, students will put a uranium core inside the reflector and add a neutron source. Although neutrons will be multiplied by the core, they will be retained by the reflector. When the source is removed, multiplied neutrons will die out. There is no danger to students, unless they come in close contact with the neutron source.

Uranium core being inserted into polyethylene reflector of training reactor at University of Texas (photo courtesy of Lockheed Aircraft).

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Bacterial inhibitor for cutting oil emulsions and coolants now on market is claimed to extend emulsion life two to four times. Material is combination of bacteriocides thimerosal and sodium o-phenylphenate. **No. 1460**

New polyethylene tank for corrosive solutions contains inner polyethylene basket to hold parts to be dipped. Tank is 12" x 26" x 12". Basket, 6" x 24" x 3", has half-inch holes for contact between parts and solution. **No. 1461**

Instrument to measure internal corrosion and record it hourly is now available. Said to detect as little as one millionth of an inch of corrosion electronically. A dual-element probe provides the measure. **No. 1462**

Lange's Handbook of Chemistry in revised, updated ninth edition can now be purchased. New material has been added, some tables are completely rewritten, many numerical values have been changed to bring them up-to-date. **No. 1463**

Rates of rusting in different parts of country are compiled in index now available. Cities with populations over 10,000 are listed, with times to rust standard, uncoated steel test panel. Index is result of 25-year research. **No. 1464**

Heavy polyethylene coating is now being used on matched weighing papers for analytical balances. Advantages claimed include cleanliness, inertness, ease of washing contents into volumetric flask, low cost. **No. 1465**

New suction device for filling pipettes can now be obtained. Designed for operation with one hand . . . thumb presses rubber bulb at top to provide suction, forefinger operates coarse air control valve. **No. 1466**

Protective coatings are subject of new bulletin. Easy-to-read table lists each coating—its description, general use, primer, number of coats, cautions, max. use temperature, colors, surfaces for coating, wear properties, chemical resistance, method of applying. **No. 1467**

Heavy-duty polyethylene bag in 5-gallon drum being used to pack reagents such as sodium and potassium hydroxide, phosphoric acid, formaldehyde and liquid chelating agents. Package is disposable, easy to handle and store. **No. 1468**

New amphoteric surfactants now in commercial production are salts of N-alkyl beta-amino-propinates. They can be either cationic or anionic and are suggested for cosmetics, shampoos, cleaners, emulsifiers. **No. 1469**

PRODUCTS OF U.S.I.

ORGANIC SOLVENTS AND INTERMEDIATES

Ethylene, Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethyl Sodium Oxalacetate, Sodium Ethylate, ISO-SEBACIC® Acid, Sebacic Acid, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P., Pelargonic Acid, 2-Ethyl Heptanoic Acid.

OTHER PRODUCTS

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Riboflavin USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide, Sodium Sulfite, Sodum Sulfate.

Alcohols: Ethyl (pure and all denatured formulas); Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL PR.

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cheaper than tantalum, the only material that has greater corrosion resistance in both oxidizing and reducing environments than the new titanium alloy. Tantalum tubing with ¾-in. O.D. and 0.020-in. walls would cost about seven times as much as titanium tubing with ¾-in. O.D. and 0.065-in. walls. But even the new alloy wouldn't compete with tantalum for many applications. As Fansteel puts it: "Tantalum is used where there must not be any corrosion attack at all."

For a completely fabricated 100-sq.-ft., fixed-tube-and-sheet heat exchanger, titanium would cost only about 1.3 times as much as Hastelloy C. Moreover, the new alloy unit will likely withstand more aggressive corrosion conditions—both oxidizing and reducing—than exchangers of Hastelloy C. Although both alloys would result in exchangers more costly than one of 316 stainless—about 2.2 times in the case of Hastelloy C; 2.8 times with titanium—316 stainless can't be used in oxidizing atmosphere.

Nonetheless, titanium producers can point to rapid, recent price cuts —two years ago, many titanium units would have cost 5-10 times those made with stainless. And if titanium prices continue to drop, Carbide's new alloy seems certain to win a good number of chemical industry jobs.

Salt Dewatering

It's often possible to combine operations to improve process efficiency. That's what Solar Salt Co. (Salt Lake City) has done with its new, $60,000 dewatering and materials-handling system for salt recovered from the Stansbury Island ponds on Great Salt Lake.

Combining the dewatering and materials-handling operations is Solar's first step in providing complete facilities for harvesting and shipping salt. The company sends its salt to the Pacific Northwest for chlorine and caustic soda production by Pennsalt Chemicals and Hooker Chemical, part owners of Solar.

Key to the new operation: an endless conveyor belt of galvanized wire woven around hickory sticks running over rubberized pulleys. The belt carries the salt through a brine-wash dewatering section of the process at a rate of about 100 ft./minute. The purified salt is then stockpiled by a shiptrimmer.

The process removes 1-1.5% of impurities, gives a product of 99.6% purity that contains a maximum of 2% moisture in the stockpiles.

Previously, Solar used portable conveyors, didn't dewater or wash as most other salt producers do. When it decided to improve its process, its combined dewatering-materials-handling system was developed by Solar personnel and Caldwell-Richards & Sorensen, Salt Lake City engineering firm.

Corrosion Site Search

Finding suitable field test sites is a problem now confronting the High Alloys Committee of the Welding Research Council. It is currently studying granular attack of austenitic stainless steels, and weathering tests are a vital part of the project.

Several-hundred test racks containing welded and unwelded specimens of molybdenum-bearing (e.g., Type 316) and molybdenum-free (e.g., Type 304) alloys have been prepared. The search for exposure sites (particularly those that have already produced intergranular failure of stainless) is being led by R. M. Fuller of International Nickel Co. (New York). Fuller is interested in receiving descriptions of potential sites, but not the specific details of the actual process to which the racks would be exposed. Cooperating companies will receive detailed evaluation of the test results.

EQUIPMENT

Sensing Probes: Hercules Powder Co.'s Young Development Division (Rocky Hill, N.J.) is out with two new liquid-level and temperature-sensing probes for high-pressure service in caustic solutions. The liquid-level probe was designed for 23-30% potassium hydroxide at 3,000 psi.; the temperature probe was designed for acid-treatment plants. Both probes are offered in a variety of protective sheathings including high-density polyethylene, polypropylene and chlorinated polyether.

•

Air Hoist: A new lightweight, portable, air-operated hoist is now being offered by Ingersoll-Rand Co. (11 Broadway, New York 4). The 1,000-

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lb.-capacity unit weighs 39 lbs., has 45-ft./minute lifting rate; the 2,000-lb. unit weighs 56 lbs., has 22-ft./minute lifting rate.

•

Car Shaker: Allis-Chalmers Manufacturing Co. (Milwaukee) has expanded its line of car shakers for speeding the unloading of granular material from hopper-bottom railroad cars to include a 3½-ton unit. The shaker, designed for small- and medium-size operations, is designed to help load four or five cars/day; it fits all standard cars.

•

Bin Indicator: A new bin-level indicator for corrosive applications is being introduced by The Bin-Dicator Co. (13946-42 Kercheval, Detroit 15). The unit has heavy cast-aluminum body and stainless-steel diaphragm, can be suspended in the middle of the bin, where it may be completely covered by material.

•

Bottle Holder: A bottle holder and carrier for protecting glass bottles is a new product by The Protectoseal Co. (1920 South Western Ave., Chicago 8). The holder completely surrounds the bottle with polyester urethane padding, has terne-plate outer body. Holders fit 5⅛- to 6½-in.-diameter bottles.

•

Packaged Feeder: Fuller Co. (Catasauqua, Pa.) offers a new, ½-, ¾- and 1-h.p. packaged feeder. Only installation steps needed: positioning at bin, hopper or conveyor discharge, and connecting one air line.

•

Pyrometer: Avco Research and Advanced Development Division (Wilmington, Mass.) has a new optical recording pyrometer that gives almost instantaneous readings of high temperatures. The new pyrometer, called Auto-Optic Recording Pyrometer, measures surface temperatures in the range 1400-3000 C with an accuracy of ±20 C.

•

Dust Separator: Torit Mfg. Co. (Walnut and Exchange Sts., St. Paul) is now offering a new Series 30 cyclone dust separator with adjustable belt drive to meet conditions of varying particle size. Torit says materials ranging from baking flour to steel grindings can be removed with efficiencies from 94 to 99.2%. Model

30-FM is designed for outdoor exhaust, Model 30-FB for indoor recirculation of cleaned air.

•

Microfilm Reader-Printer: Minnesota Mining & Mfg. Co. (900 Bush Ave., St. Paul 6) has developed a machine that automatically makes large prints—up to 18x24 in.—of engineering drawings and other documents from microfilm. The unit called the Thermo-Fax Twenty-Nine microfilm reader-printer, makes prints in less than 15 seconds, costs $919.

•

X-ray Radiographic Unit: Balteau Electric Corp. (Stamford, Conn.) has developed a versatile new X-ray machine for radiographic inspection of welds, castings, assemblies and steel structural work. The new unit, called the Baltograph 180, Panoram-x, features a head that can be used for 360-degree internal radiography as well as for external spot use. The head has a maximum rating of 180 kv. at 5 ma., weighs 111 lbs., provides penetration of up to 2¾-in. steel.

•

Feeder-Heater: The steel processing division of Fort Pitt Bridge Works (212 Wood St., Pittsburgh 22) has a new unit for heat treating and feeding granular or finely divided particles. The unit, called Model B Feeder-Heater, is available in several capacities up to 4,000 lbs./hour, can to be used for heating at 400-2400 F.

•

Generating Plants: A new line of emergency electric generating plants has been developed by D. W. Onan & Sons (2515 University Ave. S.E., Minneapolis 14). The new Series KB is rated at 50 kw., is equipped with Onan's new Magneciter generator. The firm says cost is at least $300 less than the previous 50-kw. models.

•

Electric Furnace: A new electric bench furnace offered by Electric Hotpack Co. (Cottman Ave. at Melrose St., Philadelphia 35) features insulation of fibrous potassium titanate (*CW Technology Newsletter, Nov. 1, '58*). Improved insulation allows a large space-saving over conventional high-temperature firebrick, permits the unit to operate at half the wattage of conventional units of the same size (222-cu.in. interior). The furnace will operate at 1900 F continuously, at 2100 F on an intermittent basis.

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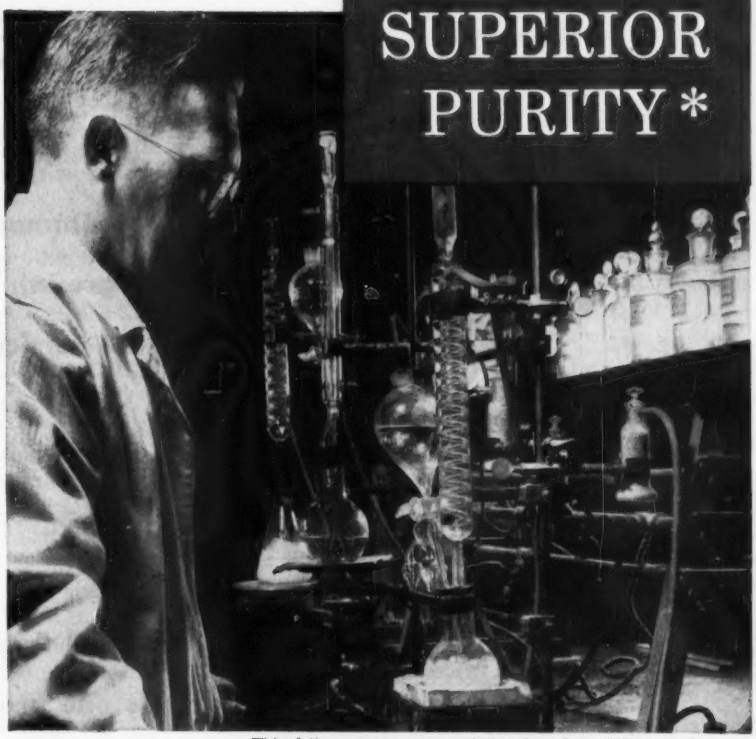

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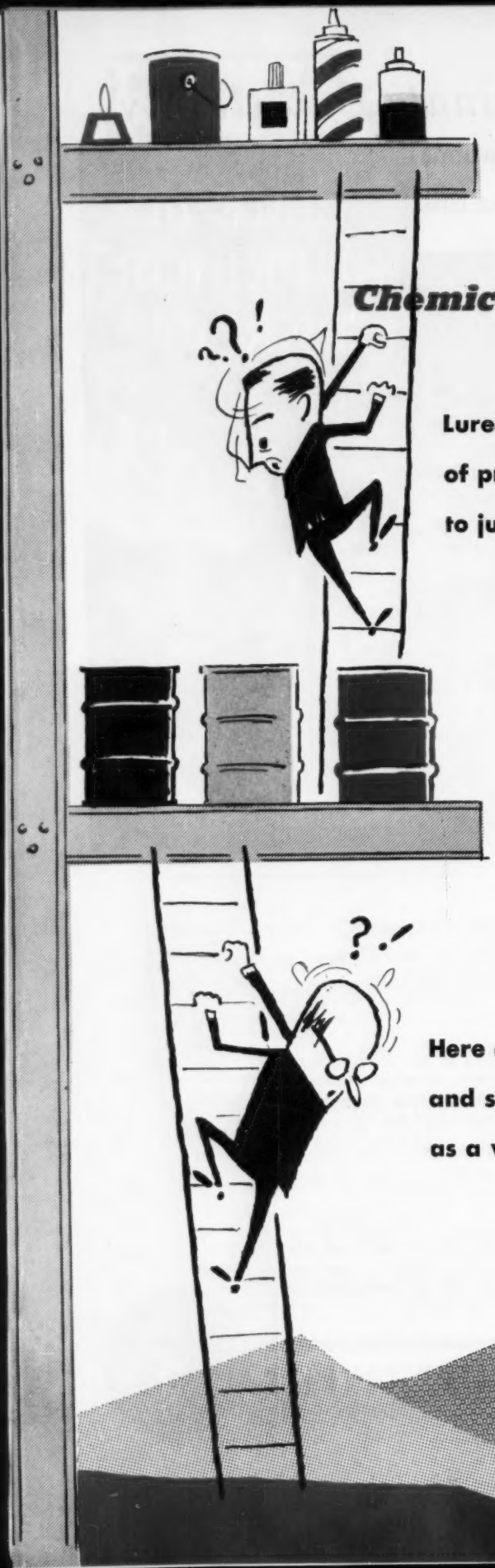


Lured on by shimmering prospects of profit and growth, CPI managers are eager to jump on the vertical integration ladder.

Like all ladders, however, this one presents some tricky footing, especially at the top.

Here are experts' views on the benefits and shortcomings of vertical integration as a way for CPI companies to grow.

INTE

no sure

RTICAL

GRATION:

ladder to profit

By James Margolis

CPI interest in vertical integration is mounting rapidly. And there's plenty of evidence that management regards it as a popular way to grow.

West Virginia Pulp and Paper, for example, recently acquired Fulton Bag Products, then formed a multiwall-bag division to further entrench in the paper bag market. Dow entered the polyethylene film market when it acquired Dobeckmun and Extruders Inc. Monsanto did likewise after acquiring 50% interest in Plax. This year, Borden will extend its consumer adhesives line; Sun Chemical, which just spun off its Warwick Wax Co. subsidiary, will increase its retail paint outlets by as much as 50%. Johns-Manville not long ago acquired Libbey-Owens-Ford Glass Fiber Co., thus adding new end-products to its existing building materials line and simultaneously capturing a glass materials supply source. Narmco Adhesives and Plastics Co. acquired Santa Barbara Plastics, made captive the latter's vinyl coated materials production. With little effort, the list of recent and upcoming vertical integrations in the CPI could be multiplied.

Right now, many process company managers are wrestling with vertical integration policy decisions. At the CCDA annual meeting in March, key men from American Cyanamid, Food Machinery and Chemical, General Aniline & Film, among others, underscored the vertical integration trend. Recently, Merck's President John Connor talked on the subject to the New York Society of Security Analysts. Robert Newton, chemical specialist for the brokerage firm Clark, Dodge & Co., spoke on forward integration in the chemical industry to the Chemical Marketing and Economics group of the American Chemical Society last month.

Today, vertical integration—moving closer to raw-material sources or closer to consumer markets—looks especially good to many CPI managers who see: (1) traditional markets noticeably crowded with new competition; (2) production costs steadily hiking despite all pruning efforts; (3) profit margins stubbornly refusing to budge from the cellar; and (4) excess capacity on their hands. A vertical move, they figure, is a sure way to stimulate company growth, to pull skyrocketing costs down to earth and to fatten scrawny profit margins.

By going basic and captively producing the raw or intermediate materials they now buy, producers hope to save on raw-material costs and add supplier profits to their own. Or, at the other end of the integration ladder, by upgrading present production, producers count on reaping customer profits and acquiring new, diversified markets.

Unfortunately, it's not as simple as all that. Serious pitfalls—traps set to snap soon after the vertical move is accomplished—line the vertical integration route. Possible disastrous after-effects: dispersed corporate assets; customer or supplier good will endangered; antitrust action by the government; established markets cut off; price wars; reorganizations; retrenching; stockholder dissatisfaction. In short, an unsuccessful sortie into vertical territory can topple profits and even unseat the management team. But a successful expansion along vertical lines frequently can fulfill management's profit and growth goals.

A few years ago, Merck tangled with vertical integration troubles when it tried to go basic in formaldehyde and hexamine. In the end, the company dropped both products when rising captive production of formaldehyde and highly variable methanol costs negated success. At the other end of the pole, Monsanto grappled with consumer marketing of its low-sudsing detergent "all". Finally the firm ended up selling the marketing rights of "all" to Lever Brothers. Remember, Monsanto was no newcomer to detergents, or to selling consumer items when it took on the consumer product "all."

With a view to pointing up the salient features of V.I. and to helping process industry management understand the potential hurdles that can trip it,

Eight ways for CPI companies to

VERTICAL INTEGRATION—*going basic or moving closer to consumer markets:*

1. Going basic by making raw materials and/or intermediates.
2. Moving closer to consumer markets by upgrading products.
3. Merging vertically with a raw-material supplier or customer.
4. Moving vertically, horizontally or diversifying by joint venture.

OTHER WAYS *for firms to grow:*

5. Merging horizontally with competition.
6. Adding new product lines but remaining at the same manufacturing level.
7. Expanding facilities for manufacturing existing products.
8. Diversifying into new fields alone or by acquisition and/or merger.

CHEMICAL WEEK offers this critical analysis of vertical integration as a way to grow. Many trenchant and varied opinions from top management men in key CPI companies are drawn upon. From their experiences, other executive managers can gather meaningful clues to the benefits and shortcomings of v.i.

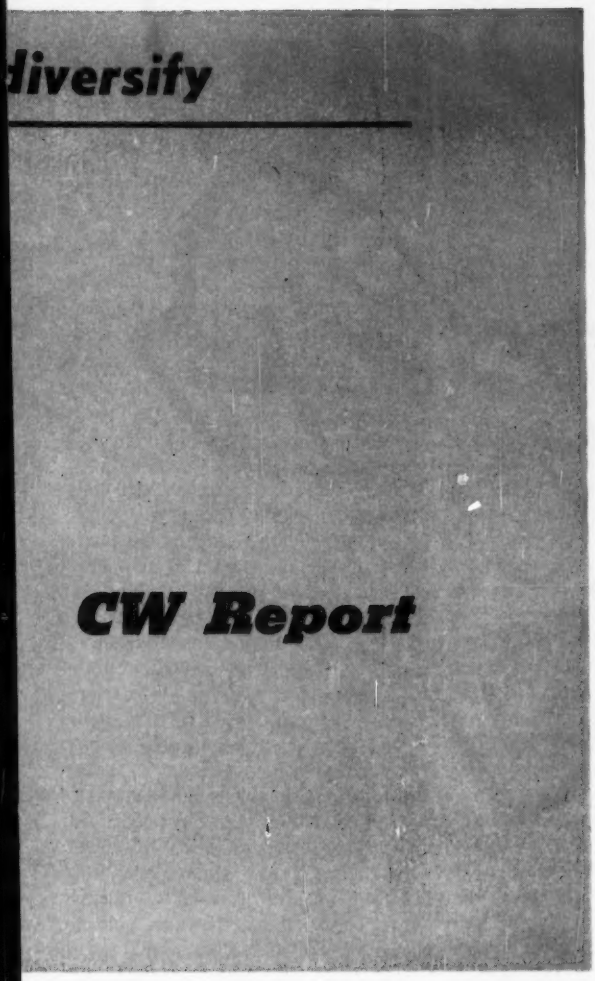
Usually, the integration ladder contains many steps between raw materials and the ultimate consumer; the number varies from product to product. Rarely is the demarcation line between levels sharply defined. Adding to the fuzziness is the confusion inherent in use of the terms "end product" and "consumer goods". For consistency's sake, in this report "end product" refers to material sold for industrial uses (Tygon tubing, for example) or sold to the consuming public (extruded plastic garden hose, for example). "Consumer goods" refers to products sold directly to the consuming public.

Conceivably, a company could expand vertically and still not move off the same level—i.e., a chemical intermediates producer may choose to upgrade its products through, say, two or three steps without making basic changes in its technology or marketing know-how. Moves of this kind initiate few new management problems, however.

But knotty problems can, and usually do, crop up in moving from one level to another, especially from the intermediates level to the consumer goods production level. And these days, CPI firms are particularly attracted to this kind of vertical move because profit margins are heftier, the closer production gets to consumer-goods markets. As with all ladders, however, the footing gets trickiest at the top.

There are four principal traps to watch for in integrating vertically:

1. Poor timing in entering a market.



2. Lack of technical and marketing skills.
3. Creating a monopoly.
4. Creating competition with customers.

Most difficult of these pitfalls to foresee, and yet perhaps the most irrevocable, is poor timing in entering a market. By creating an oversupply through forward integration, for example, an intermediates producer may provoke his customers, induce them to start price wars to hold onto their markets.

Management overenthusiasm to integrate vertically (in either direction) often results in its minimizing the importance of the timing element. What's more, the tendency is for a company to overestimate its potential share of the new market. Frequently overestimated is the potential sales of by-product markets. Experienced companies always are as careful about measuring these as they are about figuring direct-line product markets.

Lack of marketing skills is worse than lack of technical skills, especially where forward integration near the upper reaches is concerned. Usually, technology can be acquired at a price; marketing skill, on the other hand, must be developed over the years, is part of a company's way of doing business, acquired over the organization's life-span. A vinyl plastisol supplier, for example, often knows as much as or more than his customer about good slush-molding techniques, especially since the supplier is expected to provide customer technical service on this score. But it's highly unlikely that the plastisol producer will be completely knowledgeable about distribution channels for marketing, say, dolls made by slush-molding vinyl plastisols. This selling job is the customer's forte and can't be acquired overnight or for a price.

A vertical integration move that ends up with a supplier competing with his present customers is on treacherous ground because the customer can easily turn to other raw-material suppliers who aren't competing with him. Remember, too, that customer-supplier competition is a double-edged sword. The customer isn't obliged to stay at his present manufacturing level either. When he gets big enough, acquires enough capital, knows his market and buys intermediates in big enough volume, he'll think about going captive—making his own intermediates and selling excess production in competition with you. Many chemical intermediate suppliers have been forced to go more basic just because of such pressures created by former customers who went more basic.

Today, two strong deterrents tend to keep customers from going captive: (1) customers are afraid of losing the flexibility they now enjoy in being able to choose among many suppliers who are all competing with one another on price, delivery, quality and service; (2) they're afraid technological obsolescence will catch up with them on their captive products or processes.

The government's view on antitrust, specifically where vertical mergers or acquisitions are concerned, is another key factor to consider before making vertical moves. Antitrusters frown on vertical moves accomplished by merger or acquisition which may limit competitors' supply sources or their market outlets. Buying up either your raw-materials supplier or your customers in an effort to go vertical is suspect. CPI managers now have an opportunity, if they choose, to sound out the Justice Department on contemplated mergers or acquisitions.

Internal expansion along vertical lines, rather than by merger or acquisition, is a safer bet. The Justice Department regards this as a consolidation to protect reliability of raw-material sources and costs rather than as a move to reduce competition. Another good way for companies to go vertical, at this time, is

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to acquire a small outfit (either a raw material supplier or customer) that fits well in the parent firm's research and/or marketing scheme—then to build it up internally as a subsidiary or division.

MANY REASONS FOR V. I.

Increased profit is the prime motivation behind any management decision to integrate vertically. But integration has many long-term implications which suggest that other reasons are important, too. V.I. is also a way to: (1) stabilize production-sales-inventory ratios; (2) provide captive markets for chemical intermediates; (3) become versatile in meeting changes in market demand; (4) protect raw-material sources; (5) retain trade secrets.

Case in point: polyethylene manufacturers are attempting to stabilize production-sales-inventory ratios by moving into the film market—right now, the largest single end-use market for polyethylene output. Polyethylene producers were bothered by the cyclical plastic-resin supply-and-demand pattern which upset their production-sales-inventory planning from quarter to quarter and year to year. To solve the problem, practically all the major polyethylene resin producers (Dow, Koppers, UCC and Monsanto among them) have gone vertical by making film. Du Pont is showing renewed interest in polyethylene film manufacture after having shut down its poly film operations about five years ago.

Eventually, the steadily rising demand for poly film should plateau. In fact, film demand may even shift to other polyolefin types. But, by then, producers hope to find polyethylene demand burgeoning in other markets. What's more, they'll be set up to produce whatever polyolefin film market demand may dictate.

Another motive (not included in the above list) plays a less-prominent role today than in the past: the courting of stockholders' favor. Currently, stockholders (brokers, too, for that matter) are placing more emphasis on a company's research and development potential than they are on frenetic growth and high degree of integration. Today, for the most part, few companies will be motivated to merge or expand primarily to please

How Five CPI Firms View Vertical Integration

1. DU PONT:

Du Pont has no set policy on vertical integration. One reason: vertical integration is regarded as but one of many ways to diversify and grow (see table on p. 86). Decisions on whether to integrate vertically are left to general managers who head up the firm's 12 big decentralized departments. Their over-all authority and responsibilities are virtually comparable to those of many chemical company presidents.

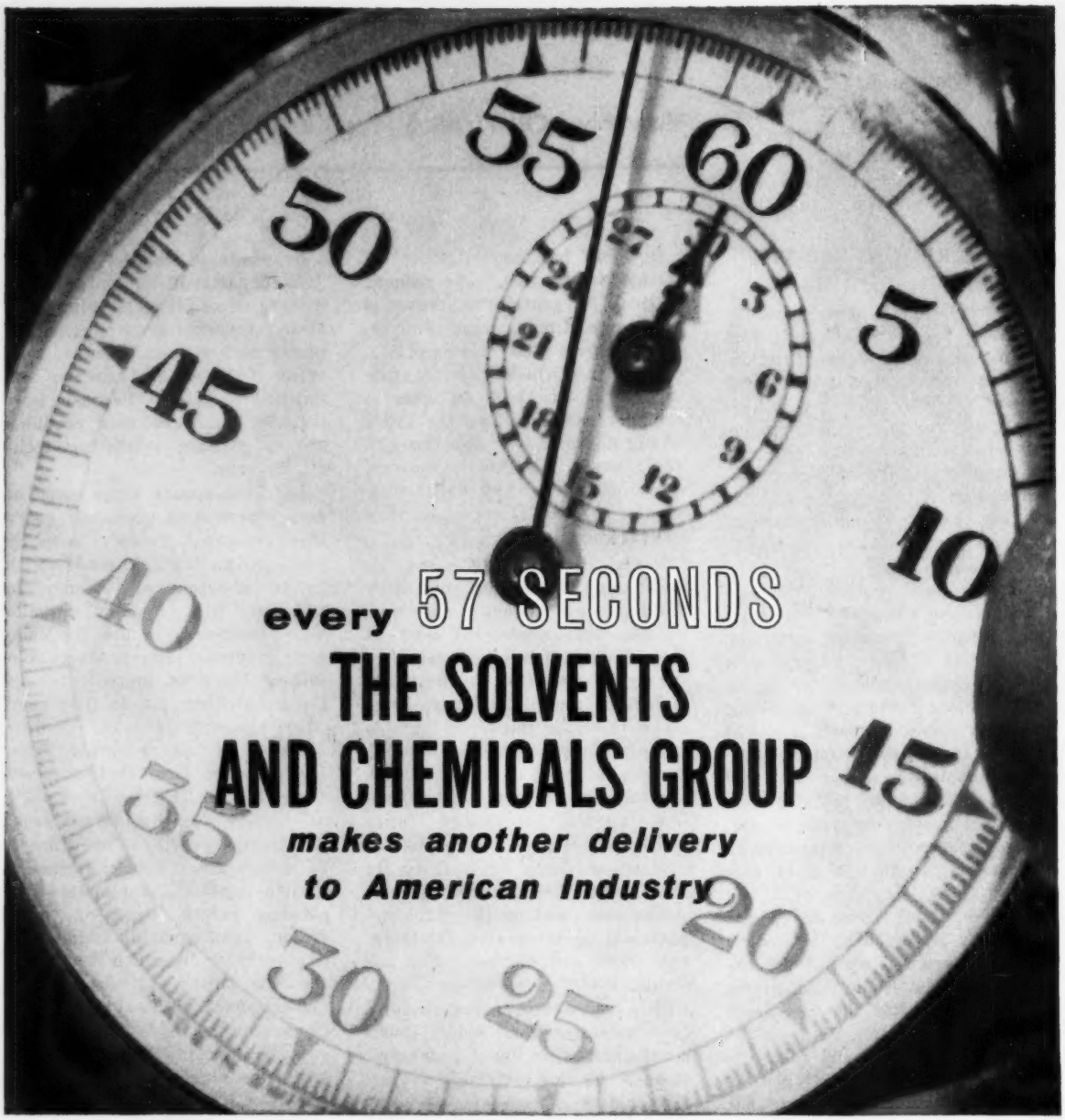
Practically all decisions on purchasing, marketing, inventory buildup, new capacity and new product development are made at the department level. Department managers are free to purchase materials from other departments, make them, or buy from outside manufacturers, depending on such factors as price, quality, delivery, availability, technological know-how needed, expansion funds available. Budget approvals for expansions come down from Du Pont's executive committee.

The end result is that each department is integrated in different ways and degrees. For example, the Textile Fibers Dept., which manufactures acetate, Dacron polyester fiber, nylon, Orlon acrylic and rayon fibers, purchases some of its raw materials and intermediates from outside and some from other Du Pont departments. Dimethyl terephthalate, used in Dacron manufacture, is bought from the Explosives Dept.; nylon intermediates, e.g., adipic acid, from the Polychemicals Dept.; most Orlon, rayon and acetate materials from outside manufacturers. Although raw-material sources vary, techniques to promote and sell fibers to the textile industry and the general public are basically related.

That's not the case, however, with the Pigments Dept., which makes and markets a variety of products, including titanium metal and titanium dioxide, and a wide range of colored pigments. This department is more highly integrated so far as titanium metal and pigments are concerned. It mines and refines ilmenite, converts it into metal sponge and finished products. Because markets for titanium-based products are so diverse, marketing techniques vary.

Du Pont spends large sums of money promoting consumer goods the company doesn't actually make (e.g., carpet made with nylon, sweaters of Orlon). In addition, the company permits some customers to use the company tradename for products containing Du Pont ingredients. To the consuming public, the company appears, in many product areas, to be fully integrated from raw materials through to the consumer level. But actually only 5% of the firm's 1,200 different products and product lines are marketed as consumer items: farm and garden chemicals, automotive specialties, paints, sponges, antifreeze, photographic film and photographic chemicals. Long ago, the firm pulled out of the retail marketing of paints because "independent retailers perform the paint selling job better." But it still maintains three retail stores to "keep its finger on the retail paint market pulse."

In an overview, then, Du Pont feels the company should do those things a big company can do best—mass production, mass marketing, research and development—leaving to others the things they, in turn, can do best. In textile manufacture, where some eight levels exist between Du Pont and the ultimate consumer, operations such as throwing and weaving are mainly left to smaller companies. In cellophane production, only two steps exist between the company and the ultimate consumer; converting is handled by smaller outfits.



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stockholders and stock brokers. That wasn't the case a few years ago at the height of the merger fever when merger was synonymous with successful management. Actually, today, R&D can better be exploited in highly integrated companies, but this fact seems to be of secondary interest to stockholders.

Another minor incentive for vertical integration: to create a demand for intermediates. The theory is, if an end-product can be marketed and promoted vigorously, the demand for intermediates used in its manufacture will be hiked accordingly. The success of a tack of this kind will depend largely on management's marketing know-how, the amount of capital available for product promotion and advertising, and, to some extent, on management's intuition and luck in timing the product's entry in the market.

FOUR WAYS TO GO VERTICAL

Totted up, there are four principal ways to integrate vertically: (1) joint venture; (2) merger or acquisition; (3) contract or long-term agreement; (4) internal expansion.

The petroleum industry has expanded vertically (from oil well to gas pump) over the past 50 years. Today, the urge is stronger than ever for petroleum firms to make and sell petrochemical intermediates and raw materials from captive petrochemical raw materials. In fact, they've jumped at promising prospects of link-up with chemical companies in order to gain entree to chemical markets. Chemical companies in turn are keen to join up with petroleum firms in order to gain raw-material supply and price advantages. What's more, indications are that common interests between chemical and petroleum industries will become, as a matter of fact, even more intimate in the next few years.

One prevalent way to accomplish the petroleum-chemical company link-up these days is by joint venture—a compromise between internal expansion and merger. Teaming up with another process firm to create a new, independent firm achieves two fundamental goals which merger also attains: (1) the risk of the new venture is shared; (2) complementary talents of both companies are combined. But the

How Five CPI Firms View Vertical Integration

2. AMERICAN ALCOLAC:

"Today there's a strong trend toward vertical integration—a relatively saner aspect of the present mania for diversification," says Carl Pacifico, vice-president of American Alcolac Corp., a small chemical intermediate manufacturer. As Pacifico sees it, the principal pitfall of vertical integration is that a company may lose sight of the possibility of gain in other directions that the same amount of investment can bring. A company must be certain that integration suits it best.

American Alcolac isn't considering vertical integration in either direction. Reason: it knows the field of organic specialties well; if it integrated backward toward raw materials, it would be entering a new field where a mass production approach would be needed; if it moved in the other direction, marketing would become more important than technology. Pacifico says the company isn't big enough to combine the two different approaches.

He believes the big temptation for chemical companies today is to go basic rather than move toward consumer markets. One reason: when new products are developed, their markets are sewed up by the end-use producer. As the markets solidify, other companies begin to move in. When this happens, the supplier at the upper end of the marketing chain is forced to think about making raw materials so he can maintain his competitive advantage. The disadvantage of going basic, Pacifico says, is this: a company can lose some of its flexibility.

3. SUN CHEMICAL:

Sun Chemical Corp. is rapidly expanding along vertical lines and will continue to do so, according to "Hap" Hoover, administrative vice-president. Resin production is almost wholly captive, while most of Sun's pigment production is marketed. The firm's vertical expansion plans are closely tied to its research and development efforts. Reason: not to protect raw-material supply or save pennies on production costs, but rather to make "tailored" intermediates to gain an edge on competition. For a company like Sun to remain strong in the printing inks and graphic arts field, Hoover says, it must continually develop new basic intermediates; otherwise, it becomes little more than a compounder of specialties.

Sun's Ansbacher-Siegle Division is in the process of going basic right now. Coating Materials Laboratory was recently acquired by Sun and incorporated into the company's paints and finishes group. Sun bought it to integrate it back from industrial finishes and lacquers to intermediates and raw materials. Currently, the division is making its own epoxy resins. Bensing Bros. & Deeney, manufacturer of flexographic inks, is now being integrated into Sun's General Printing Ink Division.

Besides going more basic, the company is clearly moving closer to the consumer. Plans are now shaping up in the company's retail division to increase by 50% the number of retail paint outlets the company owns and operates. Hoover says, "In paints, the dollars are in the end-products." Sun's major vertical expansions have come in the past year or so. Hoover claims the 10% sales increase shown in '58 is directly traceable to vertical integration moves by management.

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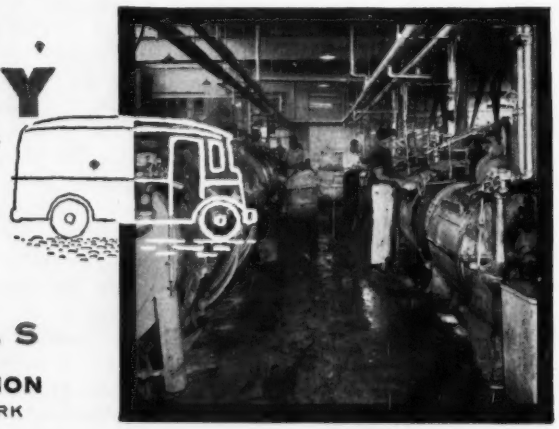

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joint venture differs from either the merger or internal expansion in that it permits the parent companies to increase their re-investment without technically increasing their corporate sizes. At the same time, it increases their capacity and/or markets without loss of corporate identity.

Recent alliances of the joint-venture type: Sun Oil and American Viscose formed AviSun for the purpose of producing polypropylene; Standard Oil of Ohio and Atlas Powder formed Solar Nitrogen to produce agricultural chemicals and acrylonitrile.

For companies that can afford it, merger is the easiest route. Sometimes, management is sold on merger even though it's not completely sold on expansion itself. Reason: merger and acquisition are forms of capital investment. A firm planning to invest a share of its earnings can, by successful merger, strengthen its market position and, at the same time, invest in a company with related or complementary products. Acquisition and merger also permit rapid entry into markets which otherwise would require a long time to develop alone.

In a strict sense, long-term contractual agreements are not true vertical integrations, but they accomplish the same ends. Arrangements of this kind are being made now between manufacturers with no sales experience in a particular product line and firms with marketing know-how. Big companies, like W. R. Grace, buy ethylene under long-term contract. Reichhold Chemicals buys methanol the same way.

Discussing long-term contracts, William Copulsky, W. R. Grace director of commercial research, says "Today, long-term contracting is a popular way to expand vertically. It's certainly a form of expansion since a financial obligation is involved. The commitment usually includes a price concession and is a principal way to protect raw-material supply. Long-term agreements also permit the supplier to upgrade his product and sell it under contract to firms with a better marketing position."

Long-term agreements generally have one serious limitation. Before an agreement is consummated, exploratory feelers must go out on a "confidential" basis. It's tough for firms that are ideally suited for one another to team up. As a result, company management may have to settle on a compromise company, even after spending time, effort and money on negotiations.

Vertical integration by internal expansion is probably one of the best ways of accomplishing the move these days but requires keen organizational talent to succeed. Decisions must be made by top management on whether or not to create new departments or spread responsibility among existing departments and executive heads. Where technological know-how is lacking in the organization, it can be hired or licensed.

Before making a decision to integrate by internal expansion, company management must resolve the question: Should we make or buy the product or products needed? Discussing the question, Theodore Hodgins, president of Century Chemical Corp. says, "The make or buy question can be resolved only after companies figure return on investment both ways, choosing the way that brings the highest return." According to Hodgins, "Return on investment will depend on break-even volume, freight rates and procurement policies." These factors must be weighed against the return from other investment opportunities. And companies attempting to answer the "make or buy" question these days would also do well to look carefully at chemical import prices before making a commitment.

"Jump" integration toward consumer products shouldn't be overlooked as a way to expand internally. When a company makes products 1 and 3 in a vertical line and another company makes product 2, the latter firm becomes both customer and vendor to the first. For the most part, jump integration as a method of internal growth hasn't caught on in chemical companies as well as in petroleum companies. Nevertheless, it should be considered along with other ways to accomplish vertical integration.

TREND OR NOT?

Some CPI spokesmen argue that vertical integration isn't a trend at all. Rather, as an Allied Chemical Corp. representative puts it: "Vertical integration is a natural phenomenon — an evolutionary corporate growth process that results from the

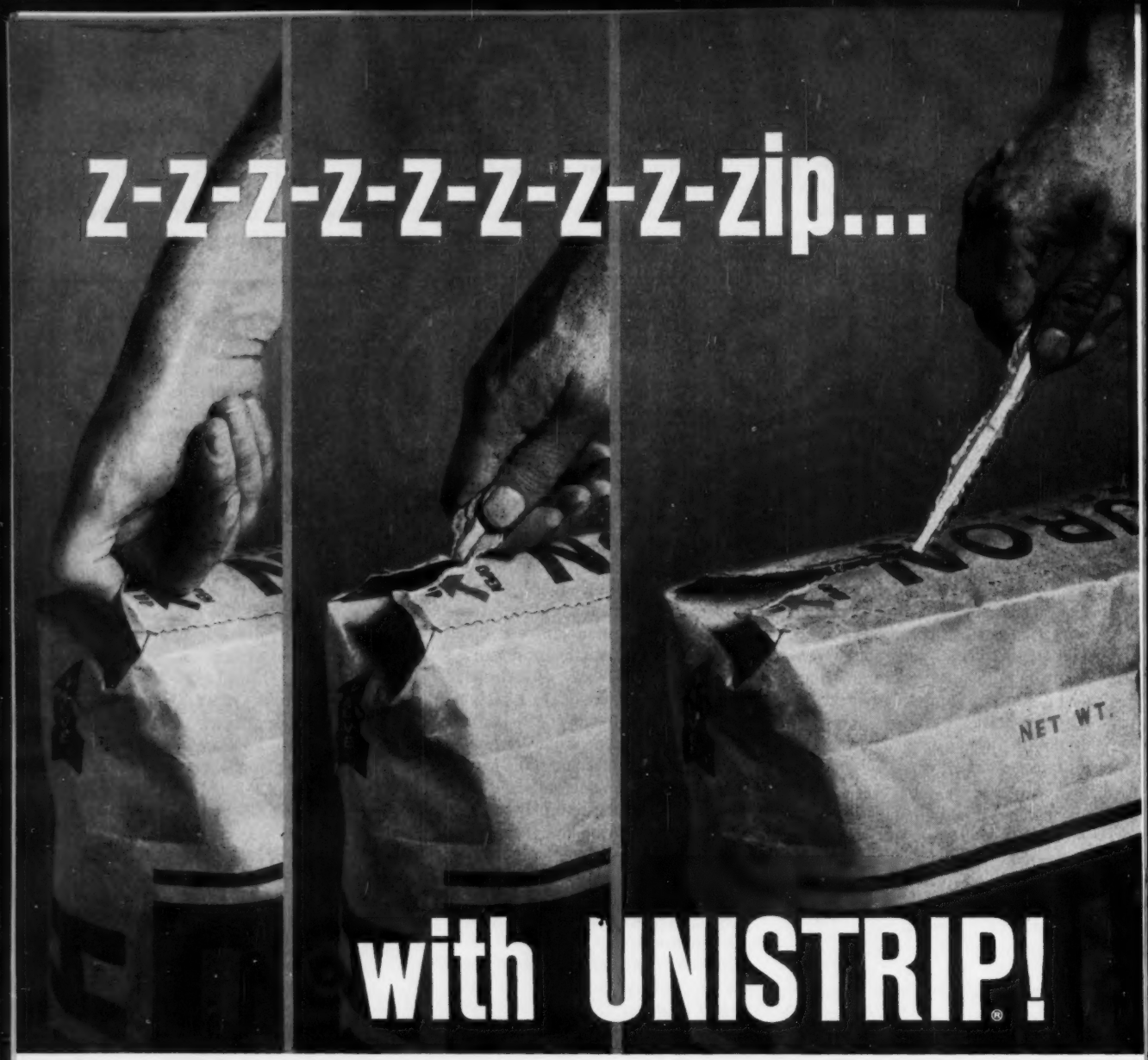
How Five CPI Firms View Vertical Integration

4. MONSANTO:

"Today, there's a definite trend toward vertical growth in chemical process companies," a Monsanto spokesman comments. He warns against "lack of marketing organization, if you're integrating toward the consumer, and lack of links in the raw-material chain, if you're integrating backward." Which direction should a company move? Monsanto feels that each case is different and depends on the attitudes and objectives of the firm involved. Sometimes circumstances force a direction. Where you stand in the long chain between raw material and consumer is important.

Monsanto, basic in phosphorus, integrated backward into petrochemicals in '55 with purchase of Lion Oil. Now it is integrating forward in agricultural chemicals. Monsanto-brand farm chemicals were marketed nationwide in '57. Last summer, a new greenhouse and experimental laboratory were opened in St. Louis for agricultural research. Many Monsanto agricultural products are sold to formulators, but Lion-brand anhydrous ammonia, for example, is sold directly to farmers.

Monsanto's unsuccessful attempt to integrate into the consumer market with "all" detergent gave the company first-hand combat experience with this form of vertical integration. After Monsanto sold the marketing rights of "all" to Lever Brothers, it disbanded its Industrial Consumer Division, dropped a number of other consumer products, including Rez and D-Leet. On the face of it, Monsanto appears to have pulled back from forward growth toward the consumer. Actually this wasn't the case at all. After disbanding the Industrial Consumer Division, a number of consumer items went to the Organic Division.



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constant search by producers for minimized costs and broader markets." Nevertheless, economic conditions can hasten evolutionary processes and prematurely force more companies into engaging in vertical integration.

There's a vast difference between the management concepts industrial producers employ and those used by producers whose products retain their essential identity in consumer markets. Top executives who want to actively engage in both areas must adjust their thinking for each case. This holds true not only in setting policy and establishing budgets, but also in staffing their organizations with personnel attuned to the respective activities.

This much is agreed by CPI management men: vertical integration should be pursued with caution. The company hopefully viewing vertical integration should wait until the contemplated markets fit into the company's scope of operations, especially marketing. It should wait also until its technological footing is sure.

They're agreed, too, that vertical integration is a step-wise process and that process firms are more involved in going basic than in integrating toward end-use products. There's some feeling, too, that the trend to integrate basically is being accomplished more by internal growth than by merger or acquisition, at least at present.

Because of the irrevocable nature of investment decisions relating to vertical integration, CPI managers would be wise to avoid being lured by the apparent charms of vertical integration (as so many were by the charms of merger just a few years ago). When the ladder is well poised, the rungs are sturdy and management's footing is sure.

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Meet the Author

James Margolis (B.S. '52—Massachusetts Institute of Technology) heads up his own firm, Chemical Marketing and Research Co. (New York), which specializes in chemical market analysis and market development. He was associated with the Dewey and Almy Division of W.R. Grace in research and with Stauffer Chemical Co. in its industrial chemical sales division.

Margolis' interest in vertical integration was stimulated by market research studies, which put him in close touch with many CPI management problems.

How Five CPI Firms View Vertical Integration

5. REICHHOLD CHEMICALS:

Reichhold Chemicals Inc. is highly integrated from raw materials to intermediates, but expansion is limited to the middle and lower rungs of the integration ladder. According to RCI President Henry Reichhold, "We do not plan to expand into consumer markets. The amount of money needed to finance consumer-goods manufacture and marketing is more than a company our size can afford." Even if RCI thought it could make more profit in consumer items, it doesn't want to compete with customers.

Reichhold figures that with its available know-how, investment dollars can best be applied to going basic. "We've been watching other companies go into consumer markets; but, in many cases, they move in and out again," Reichhold says. "The fact is, many companies view expansion and acquisition simply as a way to become big; they aren't considering stockholder profits. Only well-seasoned, extremely big corporations can succeed in moving into consumer markets."

Perhaps sometime in the long-range future RCI might consider making some end-products for the consumer—if the products were completely noncompetitive, Reichhold says. But right now, the firm is busy integrating in the other direction. A 30-million-lbs./year phthalic anhydride plant is going up in Elizabeth, N. J., should be complete this fall. RCI will soon break ground for a phenol unit in Tacoma, Wash., which will double Reichhold's phenol capacity, make it one of the largest producers.

Recently, RCI expanded epoxy, vinyl and formaldehyde facilities, but draws a line at a 25% share of the total market. When output exceeds this limit, the company buys additional requirements outside and invests available capital in other ways.

Protection against shortage is a key factor in RCI expansion policies. The firm makes about 10 basic intermediates and doesn't rely on other suppliers for them. If a strategic intermediate were cut off through strikes, shortages, etc., Reichhold says, company operations would be seriously hampered.

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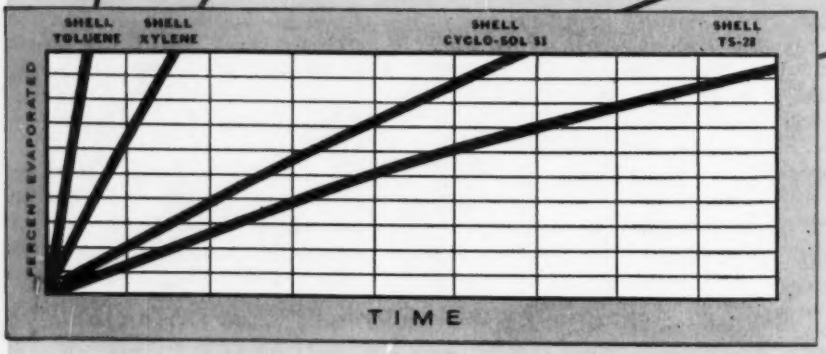

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Technology
Newsletter

CHEMICAL WEEK
April 18, 1959

Look for word soon on a liquid hydrogen plant at Bakersfield, Calif. It was built and tested over a year ago by Stearns-Roger (Denver, Colo.) and reportedly figured in discussions between S-R and Allied's General Chemical Division. The latter bid on the NASA liquid hydrogen contract, which was recently awarded to Linde Co., a division of Union Carbide Corp. (*see p. 41*). Government agencies are believed to be still interested in the Bakersfield facility, may disclose plans within the next week or two for utilizing liquid hydrogen from this source.

One of the projects slated to use liquid hydrogen is Centaur—consisting of an Atlas missile with a liquid-hydrogen-fueled second-stage engine and a new third stage. Its liquid hydrogen engine should enable the Centaur to put a 5-ton payload into low orbit or to launch a 2,000-lb. payload on deep space missions.

Centaur is an Air Force project under contract to Convair division of General Dynamics, but will be transferred to NASA on July 1. NASA also uses liquid hydrogen for the NASA-AEC classified Project Rover, will receive fuel for this project by tank truck from Linde's Torrance, Calif., plant.

•

Another potential use for the plasma jet may be opening. Plasma-jet formation of refractory metal nitrides was revealed at the ACS meeting in Boston last week (*see p. 40*). The work was done by two researchers from the Research Institute of Temple University—Charles Stokes and W. W. Knipe.

Using nitrogen as the working gas, they introduced a finely divided metal into the plasma. This forms the metal nitride; excess metal is vaporized, so the only contaminant in the product is the metal itself. The product is condensed on a water-cooled "cold finger." Stokes and Knipe have tried four metals—titanium, magnesium, molybdenum and tungsten. Titanium nitride was formed readily; molydenum and tungsten were not formed.

Stokes and Knipe see commercial possibilities in the method—still in the lab stage—for coating objects or for fabrication of nitrides; by spraying the jet plasma on a mandril, shaped objects are readily produced. They point out that conventional nitride processes give powdered nitride. And if the oxide is used as the starting material (with carbon as the reducing agent), the product is difficult to purify.

Linde Co. has been working on a similar idea (*CW, Dec. 13, '58, p. 27*). Its main interest, however, appears to be in using an inert gas for the plasma and so producing the pure metal. But it is unlikely that Linde—with its big interest in gases—has not at least investigated using nitrogen to make the nitride.

Technology Newsletter

(Continued)

A vaccine that will prevent from 60-70% of all common colds is foreseen within the next 24 months by Thomas Ward, professor of virology at Notre Dame University. He bases his prediction on recently created techniques that have enabled researchers to isolate viruses. Ward has prepared a vaccine now being tested on Notre Dame students, employees of Bell Telephone Co. in St. Louis, and prisoners in Maryland.

•

Chemicals may replace milk now used for raising dairy calves, according to L. J. Bush of the Oklahoma State University (Stillwater, Okla.) dairy dept. Bush seeks to replace the milk with salts of fatty acids or gluconic acid salts. Savings could amount to $10 per calf.

•

A new drug to control excess cholesterol in the body, a condition believed to contribute to heart and artery disease, was revealed at this week's meeting of The Federation of American Societies for Experimental Biology, in Atlantic City. The new drug, called MER-29 was developed by The Wm. S. Merrell Co. (Cincinnati), division of Vick Chemical Co. MER-29 is 1-[(4-diethylaminoethoxy)-phenyl-]-1- (*p*-tolyl)-2-(*p*-chlorophenyl)-ethanol. It appears to inhibit or suppress conversion of intermediates (probably 3-β-hydroxysteroid) into cholesterol.

•

A new way to build flame resistance into plastics has been developed at Stanford Research Institute (Menlo Park, Calif.). It involves synthesis of a highly chlorinated monomer (3,3,3-trichloro-1-propene), which is then polymerized with other synthetics. SRI has prepared a high-melting, nonflammable homopolymer of the new material, says the monomer can also be "structured" into polyethylene and polyvinylacetate to contribute flame resistance.

•

Argon gas can be cleaned easily and inexpensively, Hungarian researchers claim, by exposing the gas to hot copper shavings, caustic solution, hot titanium shavings, and phosphorous pentoxide. The process, says the Budapest Daily *Nepszabadsag*, yields 99.7% pure argon, will permit use of domestic argon in Hungarian light metal plants.

•

Add Switzerland to the countries with Chemshows. Germany held its 12th, called Achema, last year *(CW, June 12, '58)*. The U. S. hold its 27th Exposition of Chemical Industries late this year. The first Swiss show, called ILMAC, will take place Nov. 10-15 in Basle, will include local and foreign manufacturers' exhibits of laboratory apparatus, measurement and automation equipment. A scientific meeting, covering the same fields, will be held in conjuction with the exhibit.

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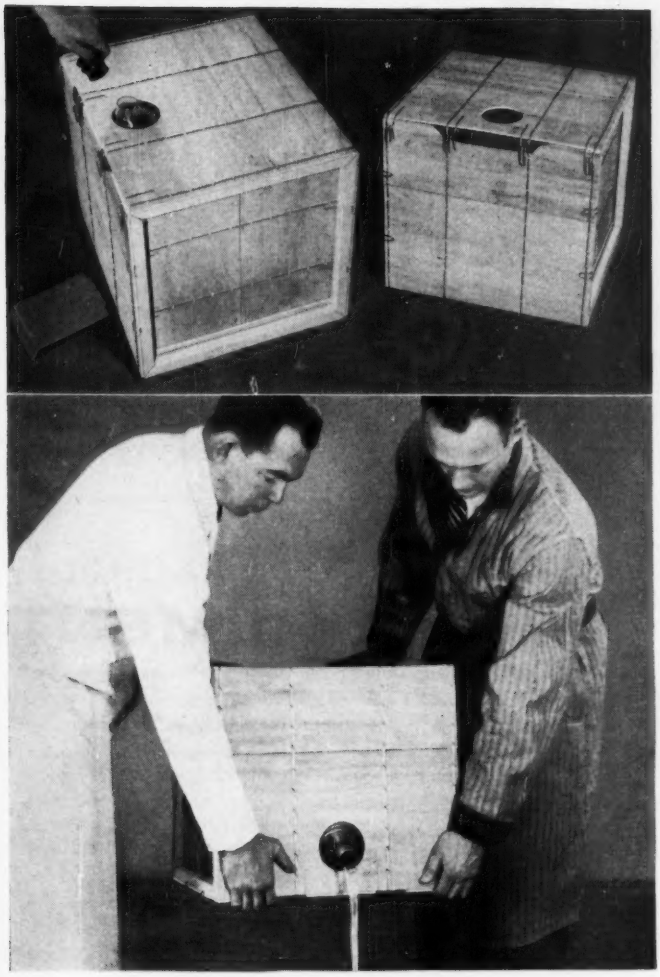

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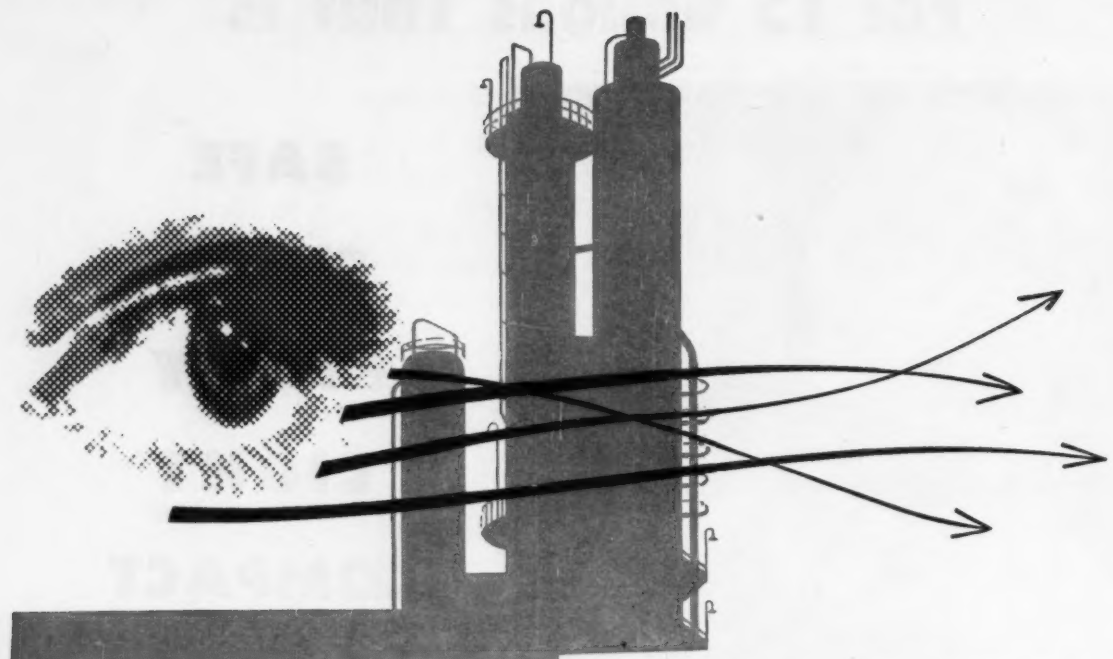

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- Permitting greater participation in the European 'Common Market.'

License Program Nets Process Dividends

The continuing growth of foreign markets for new chemical products and processing know-how is inspiring an ever-increasing number of chemical processors to get into potentially advantageous licensing activities. This week Diamond Alkali Co. (Cleveland, O.) took stock of its five-year-old licensing program, came up with some tips on how to guarantee a payoff from the sale of know-how.

Licensing is nothing new to the chemical process industries; it's the stock in trade of engineering firms and most of the large chemical companies. But Diamond Alkali's experience is a good example of what a medium-size firm can accomplish through a carefully planned licensing program.

In the normal course of chemical manufacturing, most companies gradually develop a fund of information broadly categorized as know-how. This fund includes a variety of tangible and intangible assets such as patents, research and development data, design factors, operating experience, equipment history, market analysis and management capability. And like any other asset, says Diamond, these intellectual properties can be sold.

In the past five years, Diamond has licensed nine processes to 16 companies in seven countries, is currently negotiating with several others in the U.S. and abroad. These agreements cover a broad range—from a simple mechanical device or patent license requiring no transfer of know-how to a heavy capital investment that includes the transfer of complete technology and operating experience.

Payoff in Intangibles: Aside from the financial considerations, what motivates a chemical firm to enter the licensing field? Diamond executives list several reasons:

- Licensing provides a means of growth outside the U.S. by laying the groundwork for future foreign manufacturing operations. This can be an important factor, depending on a company's long-range goals.
- Association with licensees gives management and technical men keener insight into operations and problems of foreign processing industries, broadens their experience, and helps them to mature more quickly than the same amount of time spent in domestic operations.
- Domestic operations are frequently improved as a result of process modifications necessary to fit the process into a licensee's operations, or through foreign technical know-how that can be applied to processes in the U.S.
- U.S. firms can maintain participation in the European "Common Market" by utilizing licensing activities to offset reductions in export sales.

Diamond's program is based on the fundamental belief that a prospective licensee is a prospective business partner. Therefore, the company is anxious to secure the success—economic as well as technical—of its licensed operations, since its own reputation and its prestige in the foreign country are at stake. Diamond has been known to turn down a licensing deal because it felt that the chance of financial failure outweighed the potential gains.

To insure a successful operation, Diamond offers as part of a license deal a complete range of services, including management counsel, a complete technical know-how package, advice and counsel on design, engineering services, personnel training and plant startup assistance. In addition, the company supplies a continuing flow of information and new developments in the process throughout the period covered by the pact. Goal:

to have a competent, financially successful licensee who feels that he is getting his money's worth.

Mutual Benefits: Diamond also places considerable importance on the incentive that licensing activities provide for research and process development. It gives individual research groups a high degree of satisfaction to know that their work is being employed widely. And because many groups within the company are involved in licensing, including research, patent department, legal and operations, the incentive covers the organization pretty much as a whole.

Foreign operations can also provide the opportunity to develop new ideas and technology that can't be tried in established processing operations. Diamond's experience with a Dutch soda ash plant is a good example of how close cooperation of licensee and licensor benefits both.

In general, the chemistry of the soda ash process hasn't changed materially in more than 50 years. Soda ash plants require high capital investment—estimated at $25,000-40,000 per daily ton of capacity—and therefore can't be replaced very frequently. The newest U.S. soda ash plant was built over 20 years ago. (Westvaco's Green River, Wyo., plant is newer, but it processes natural soda ash rather than making it by the soda-ammonia process—*CW Sept. 12, '53, p. 50.*)

Diamond's plant at Painesville, O., was built in 1911. And though it was modernized in the late '20s and is currently undergoing an extensive rebuilding and modernization, it still employs the same basic process.

Over a period of years, Diamond has developed a number of major improvements in the process. But since the new ideas must be installed from the ground up, it hasn't been practical to incorporate them into the existing facilities at Painesville.

Dutch interest in building a new soda ash plant at Delfzijl, Holland, presented the opportunity to put the new ideas into practice. The Dutch principals wanted a plant of advanced design that would successfully meet established European competition. To get it, they were willing to accept possible startup troubles common to the introduction of any new technology that hasn't been proved in full-scale commercial operation.

Fortunately, sufficient background and engineering experience was available to get all of the innovations working successfully. Result: the Dutch soda ash plant is considered to be of the most modern design in the world today. Though none of the new features of the Dutch plant are being employed in the Painesville modernization, Diamond feels sure that the operating data and experience gained from the Holland job will pay off in the design of future plants at home.

Avoid Pitfalls: To assure the success of a licensing program, cautions Diamond, it's important to take into account the difficulties inherent in foreign operations. For example, it's frequently necessary to transfer personnel to the foreign licensee's plant for considerable lengths of time. When such moves involve the men's families, says Diamond, the problems of living under unfamiliar conditions rapidly dull the glamor of foreign service. Therefore it's of primary importance to consider the adaptability of men transferred abroad.

It's also very important to keep licensing activities in proper perspective, says Diamond. That is, licensing

WIDE WORLD

Plasma Couple Generates Power

Successful operation of a new nuclear power device — first to convert reactor heat directly into electricity — last week brought smiles of satisfaction to these members of Los Alamos Scientific Laboratory's development team (*left to right*), team leader George Grover, consultant R. W. Pidd of University of Michigan, and Ernest Salmi. Heart of the compact generator is a plasma thermocouple that employs a small cylinder of uranium carbide as one element of the couple and ionized cesium metal as the second element. When their temperature is raised to several hundred degrees centigrade by the fission heat in a reactor core, direct-current power several hundred times that generated by conventional metallic couples is produced. Output of the initial device is about 100 watts. Next step: a larger version capable of generating up to 5 kw.

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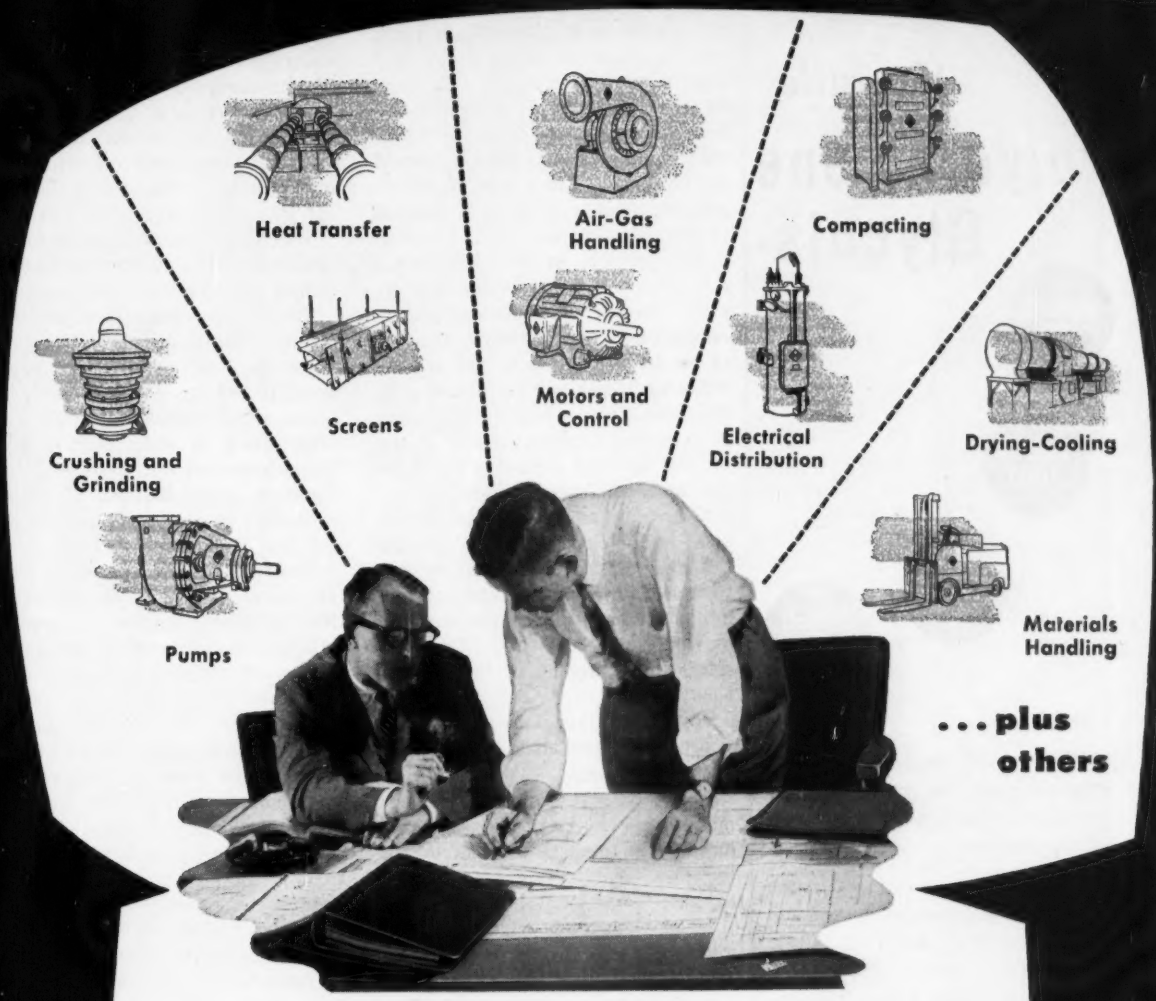

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must not be allowed to interfere with the company's main business of manufacturing and selling its products. Royalties received through licensing are one means of recovering research and development expenses, thereby contribute to the company's earnings. But since royalties are generally only a secondary contributor to over-all income, says Diamond, licensing should not be permitted to assume more importance than it deserves in relation to the main activities of the business.

The problem of exclusive versus nonexclusive licensing is also troublesome. In general, Diamond prefers nonexclusive arrangements, attempts to set the license fee so that a nonexclusive license will be attractive to the client. The company's basic policy is to permit unrestricted sale of the product involved regardless of exclusive or nonexclusive licenses.

Communication Key: One ticklish point in any licensing operation, says Diamond, is that of communications. Complete understanding and accurate interpretation of information supplied by the licensor is vital. Diamond solves most communications problems before they arise by setting up a system for funneling all information through one man at each end of the operation.

The company also smooths communications by arranging personal meetings at frequent intervals during the installation period between the top men from both sides.

In addition to this centralized communication system, the companies exchange experienced technical personnel—Diamond men going to the foreign plant while the licensee's men study Diamond's procedures in the U.S. On the Dutch soda ash project, for example, as many as nine representatives of the Dutch company were in residence in this country at one time. Result: men who had never before run a soda ash plant are operating the Dutch installation with skills acquired at Painesville.

Future Progress: Diamond's top management is pleased with the results of its program, feels it has proved that the advantages of licensing aren't restricted to the giants in the industry. What's more, they're equally enthusiastic about the potential of such activities, are confident that the progress to date is only a beginning.

Closed-Loop Control

The recent startup of Texaco's completely automatic polymerization unit at Port Arthur, Tex. (*CW Technology Newsletter, April 11*), raised the curtain on a computer performance that's certain to find an interested audience in the chemical process industries. Management men responsible for planning in the process, systems and instrument engineering fields will be watching Texaco's computer system closely for clues on how to close the control loops on their own processes.

Texaco's polymerization system is relatively simple, compared with many other chemical and refinery operations. It consists of 10 catalytic reactors, each containing three fixed catalyst beds in which refinery gases are polymerized into gasoline blending stock. Input is about 15 million cu. ft./day of gas; output, about 1,800 gal./day of blending fuel.

Heart of the control system is a Thompson Ramo Wooldridge RW-300 computer. Its job: to monitor 110 process information inputs and control 16 different flow rates, pressures and temperatures in various combinations. The RW-300 continuously computes catalyst activity levels, resetting the plant's controls every five minutes to maintain optimum, around-the-clock operating efficiency.

By correcting operating fluctuations in the shortest possible time, the computer is expected to boost overall efficiency of the unit from 85-87% — tops for an expert crew of human operators — to a minimum of 93%. One result could be the doubling of catalyst life (beds now last about three months), which would save up to $75,000 annually on catalyst replacement costs.

The cost of Texaco's computer installation can't be pegged exactly, since it was tied in with other modernization changes in the unit. The computer cost $98,000; instruments for translating process data into the computer's digital language added about $36,000. Other instruments and engineering extras brought the total close to $300,000 — or just slightly less than 10% of the total $4-million value of the polymerization unit.

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BOOK NEWS-NOTES

FLUIDIZATION

Just Published: Clear treatment of the fundamental developments of fluidization. Fully discusses the fluidized state, fixed bed and onset of fluidization, the expanded bed, elutriation, dilute phase and moving solids, the spouted bed, heat transfer, mass transfer and solids and fluid mixing. Special features include critical presentation of numerous working correlations and explanation of fluidization phenomena relating to flow of fluids through fixed beds. *By Max Leva, Consulting Chemical Engineer. 384 pp., 184 illus., $11.50*

EPOXY RESINS

Comprehensive guide to the field of epoxy resins, covering the chemistry of their preparation and applications in industry. Brings together available data on the resins; gives information on their synthesis and curing mechanisms, curing agents, and materials used as fillers and modifiers. Includes application techniques and handling methods for use of the epoxies in laminates, adhesives, coatings, etc. *By Henry Lee and Kris Neville, Epoxylite Corp. 304 pp., 176 illus., $8.00*

HOW TO BECOME A PROFESSIONAL ENGINEER

Answers questions about the what, when, where, how, and why of licensing regulations and examination procedures so you can take at once this important step for an increasingly successful engineering career. Covers the entire registration process, from preparing your application to taking the examination. Shows the seven requirements for licensure in any state, how to write up your experience on the application, how to prepare for—and pass—the examination. *By John D. Constance, Mechanical Engineer, M. W. Kellogg Co. 262 pp., $5.50*

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the company feels, is the experience and know-how that will be gained from this first full-scale closed-loop system — and the role it will play in the development of future computer-controlled plants.

PROCESSES

New Columbium Ore: The Canadian firm of Nova Beaucage Mines, Ltd., has developed a "technically successful" process for flotation of pyrochlore, the columbium ore. The firm notes that the ore cannot now compete with columbite concentrates, but it believes that expanding markets for columbium will make production from pyrochlore commercially feasible. It plans to produce a limited amount of pyrochlore concentrate at its pilot mill at North Bay, Ont.

•

Lime Hydration: Utah Lime & Stone Co., subsidiary of Flintkote Co., will use the Corson lime hydration process of G. & W. H. Corson Co. (Plymouth Meeting, Pa.) in a new, million-dollar lime plant. The unit is under construction at Dolomite, Utah.

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Cellulose Process: The Czech Academy of Science claims to have a new process for production of cellulose from waste wood. Main product of the process — boiling the wood in methanol and hydrochloric acid—is said to be 80-85% cellulose, usable directly for manufacture of cardboard and coarse wrapping paper.

•

Tracing Uranium: Use of natural radioactivity in processing uranium ores is proposed by U.S. Bureau of Mines' Intermountain Experiment Station (Salt Lake City). Among the ways in which natural radioactivity can be turned to processing use:

- Gamma-ray detectors in closed vessels automatically give pulp levels in leaching.
- Similar devices can be used to control the countercurrent washing that separates uranium-bearing solutions from gangue.
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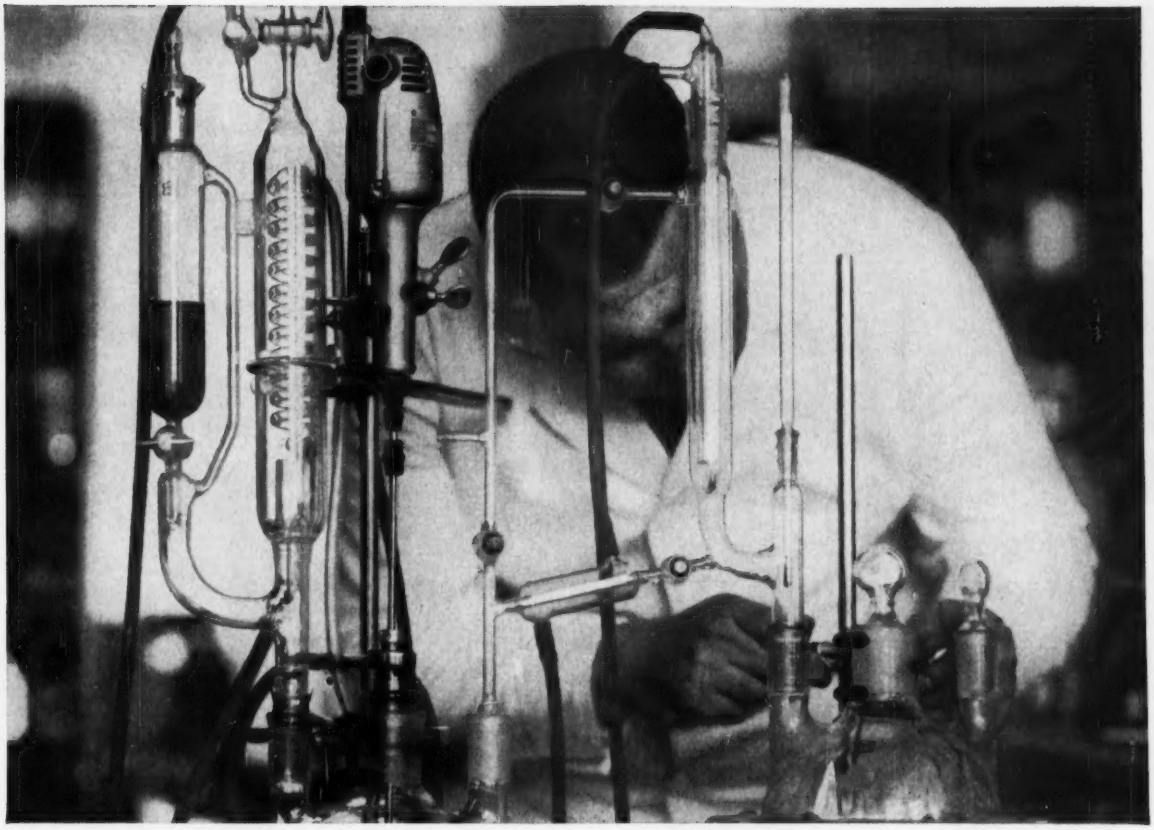

How organic chemists put lithium to work

Recent interest in organolithium compounds owes much to the fact that these compounds are soluble in hydrocarbons. The reactions of the organolithium compounds resemble those of organomagnesium compounds, yet have distinct advantages. In solution, lithium compounds exhibit a degree of reactivity intermediate between alkali and magnesium reagents.

Where it is necessary to use ether solvents, it is found that organosodium compounds decompose most ethers too rapidly. The organomagnesium compounds have too slow a reaction rate to be useful. With organolithium compounds the desired reaction can be completed before the ether is substantially attacked.

To produce intermediates for further reaction, certain ethylenic and aromatic systems add lithium and other alkali metals to give metallic derivatives. Lithium appears to react more readily than sodium or potassium and sometimes follows a different course of reaction.

Lithium metal and lithium alkyls seem to have the ability to direct the course of a polymerization. Isoprene has been polymerized to a product containing over 93% cis-1,4 addition product. Such polymers are considered to be the nearest approach to natural rubber. This stereospecific behavior of lithium catalysts may be useful in other organic reactions.

Reduction by means of alkali metals can be accomplished by using sodium in high-boiling solvents and in liquid ammonia. Recently it has been reported that the use of lithium often gives better yields. The versatility of lithium as a reducing agent in ethylenic and aromatic compounds is shown by the selective reduction of the carbon-carbon double bond of a conjugated ethylenic ketone using lithium in liquid ammonia. A contrasting example is the selective reduction of the carbonyl group of an unsaturated ketone using lithium aluminum hydride.

But this is only the beginning. Though the information on lithium in organics is relatively limited, its vast potential in this field is already well established. We'll be glad to share this information with you if it can help you in any way with your specific organic problem. Address letterhead request to Technical Literature Department, Foote Mineral Co., 420 Eighteen W. Chelten Bldg., Phila. 44, Pa.

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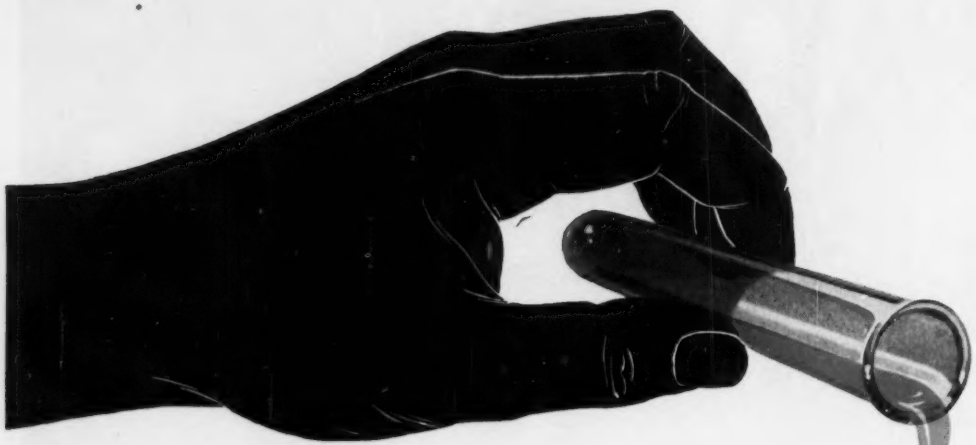

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Bristol's Bowman (left) and Beecham's Lazell plan new antibiotic entries from 'shared' research.

Co-op Research Hikes Penicillin Specificity

Last week's cooperative research agreement between Bristol-Myers Co. and Beecham Group Ltd. of London (CW Technology Newsletter, April 11) promises to be the key to a new U.S. antibiotic market—chemically synthesized penicillin derivatives.

The agreement gives licensing rights to Bristol Laboratories, Inc., a subsidiary of Bristol-Myers, for use of Beecham's patents and patent applications here in the U.S. concerning production of 6-aminopenicillanic acid, the basic nucleus of penicillin. It also provides for a mutual research effort between the two firms, and allocates certain market areas to Bristol (although Beecham has kept rights to export to the U.S.).

Economics Favorable: Philip Bowman, president of Bristol Labs, told *CW:* "We can manufacture the penicillanic acid in large quantities, with equipment we now have, and keep down the cost of the basic raw material for possible new penicillins. This should lead to relatively lower-cost derivatives when they are found." He adds, "We're not aiming at today's penicillin market — although new types of penicillins will undoubtedly take some of it — but rather at a new market, where the activity of present-day penicillins has made them useless as medicinals. Considerable promise is shown by some derivatives still in the lab, for combating so-called 'resistant staph' (*Staphylococcus aureus*), a major problem in hospitals." Bowman won't speculate on a prospective market, but knows he's in a good position so far as U.S. penicillin research is concerned.

Process Simple: Beecham's process is relatively simple, according to H. G. Lazell, chairman (equivalent of president) of the firm. "It's a matter of fermenting a mould as if you were making a 'standard' penicillin, but stopping the process at the right time, extracting the 6-aminopenicillanic acid by ion exchange." F. Doyle and G. Rolinson, who head up the London firm's penicillin research group (*see picture, p. 110*), note that from then on it's a matter of ingenuity. There's an indefinite number of side chains that can be added to the acid by replacing the hydrogen atom.

Beecham's biological-chemical approach is actually the third approach taken by researchers attempting to upgrade penicillin. The other two were made by John Sheehan, professor at Massachusetts Institute of Technology. Sheehan, supported by

Bristol, succeeded in synthesizing penicillin entirely by chemical means, also developed a method of splitting off the side chain from penicillin-G, made by the fermentation method. But both proved commercially infeasible. MIT has patents pending on Sheehan's discoveries. And if either prove valuable in the future, Bristol has production rights by virtue of its supporting the research. Sheehan, who is still on Bristol's "payroll," thinks they have really hit the jackpot (even though they aren't using his process), in being able to produce the starting material cheaply. He will be working on new derivatives for Bristol, but cautions that "none have been clinically tried to date; we aren't sure if any will prove out."

Others Research, Too: Pharmaceutical firms in the U.S. have been working on this problem for some time, are keenly aware of the competitive significance it will have. Among them:

Pfizer—A Pfizer spokesman says the firm has been working on new "synthetic" penicillin routes for nine years. But he says nothing about progress. He adds, "Pfizer was one of several firms approached by Beecham before the Beecham-Bristol agreement was made."

E. R. Squibb — Asger Langlykke, director of the Squibb Institute for Medical Research, claims they have been working from two approaches, both Sheehan's, but have made no substantial progress. He notes that there is a limit (from the medical value point of view), 8-10 carbon atoms, to the length of the side chain researchers can add to the penicillanic acid. Beyond that point, antimicrobial activity diminishes.

Langlykke sums up his views this way: "Beecham is running its hopes too high. The aminopenicillanic acid has very low antimicrobial activity itself, and even with the addition of side chains, which upgrade the activity, it's all a relative matter—depending on which germ you are using as a standard."

Merck—The firm claims to be working on a dozen compounds prepared by Sheehan, finds they are active but not enough to have commercial value.

Abbott Labs — Arthur Weston, director of research and development, reflects a "not so hopeless" attitude for competitors of Bristol.

He notes that the Beecham patents that Bristol will utilize probably are process patents, as the 6-aminopenicillanic acid has been known for some time. Other firms can still make the intermediate in the lab and try working up new penicillins. If a medically valuable one is found, it certainly would give the finder bargaining power to make a deal with either Beecham or Bristol for use of the process to make the 6-aminopenicillanic acid. There is, of course, an outside chance that another economical process could be devised to make the intermediate. Abbott is not working on new penicillins now, but is considering it, in the light of recent developments. The new process, Weston says, enables researchers to add "acid residues," which in the fermentation process were rejected as a side chain. They may or may not be of value, but they're good prospects.

The Beecham process, regardless of its eventual value, will certainly be the cause of a shift in research management strategy on today's penicillin projects.

Beecham's Doyle, Rolinson split the penicillin molecule.

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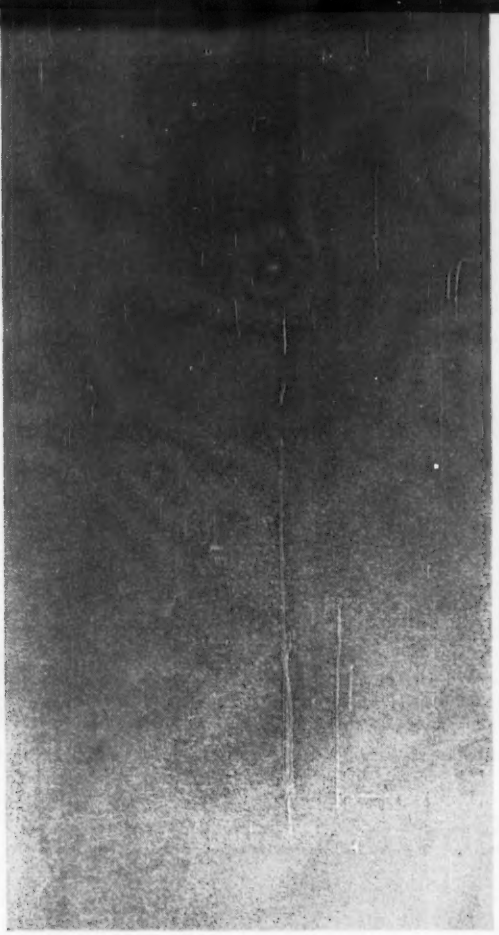

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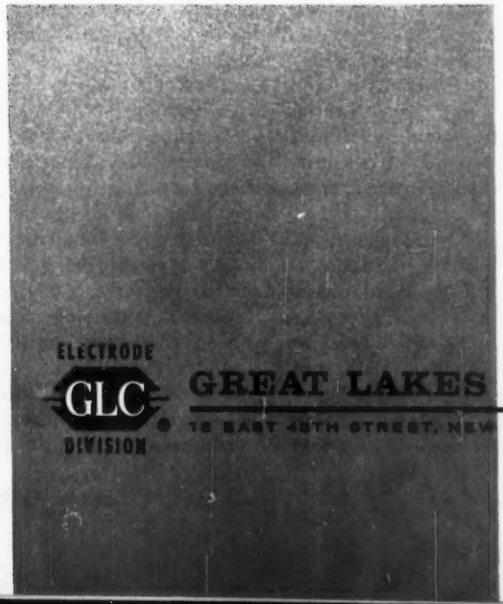

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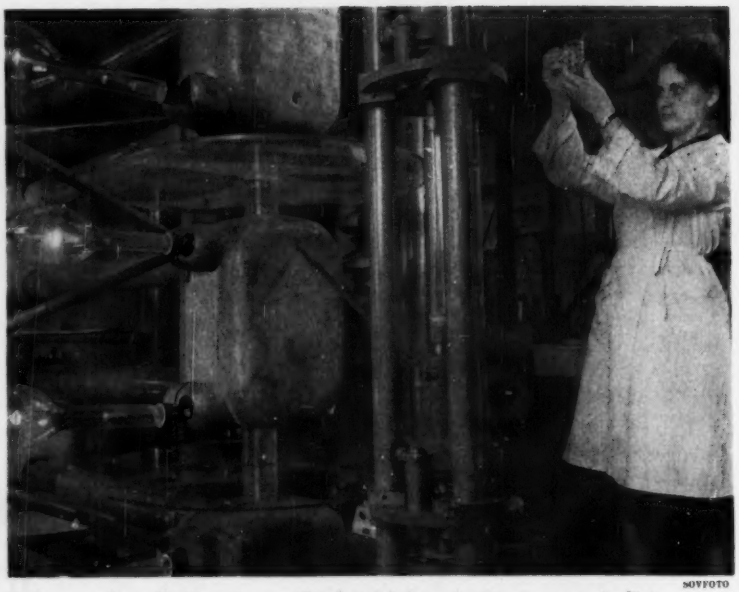


SOVFOTO

Polymer irradiation is on Soviet high-priority research list.

New Soviet Challenge?

Western observers at Moscow's recent Eighth Mendeleyev Chemical Congress gained an impression of vigor and growing maturity in Soviet chemical research. But the meeting—first of its kind in nearly 25 years—turned up some Soviet worries, too.

Congress participant Nikolai Emanuel, recently elected corresponding member of the Soviet Academy of Sciences, timed a comment-generating article in *Pravda* to coincide with the meeting. It voiced concern about the possible pirating of Russian inventions by non-Soviet countries.

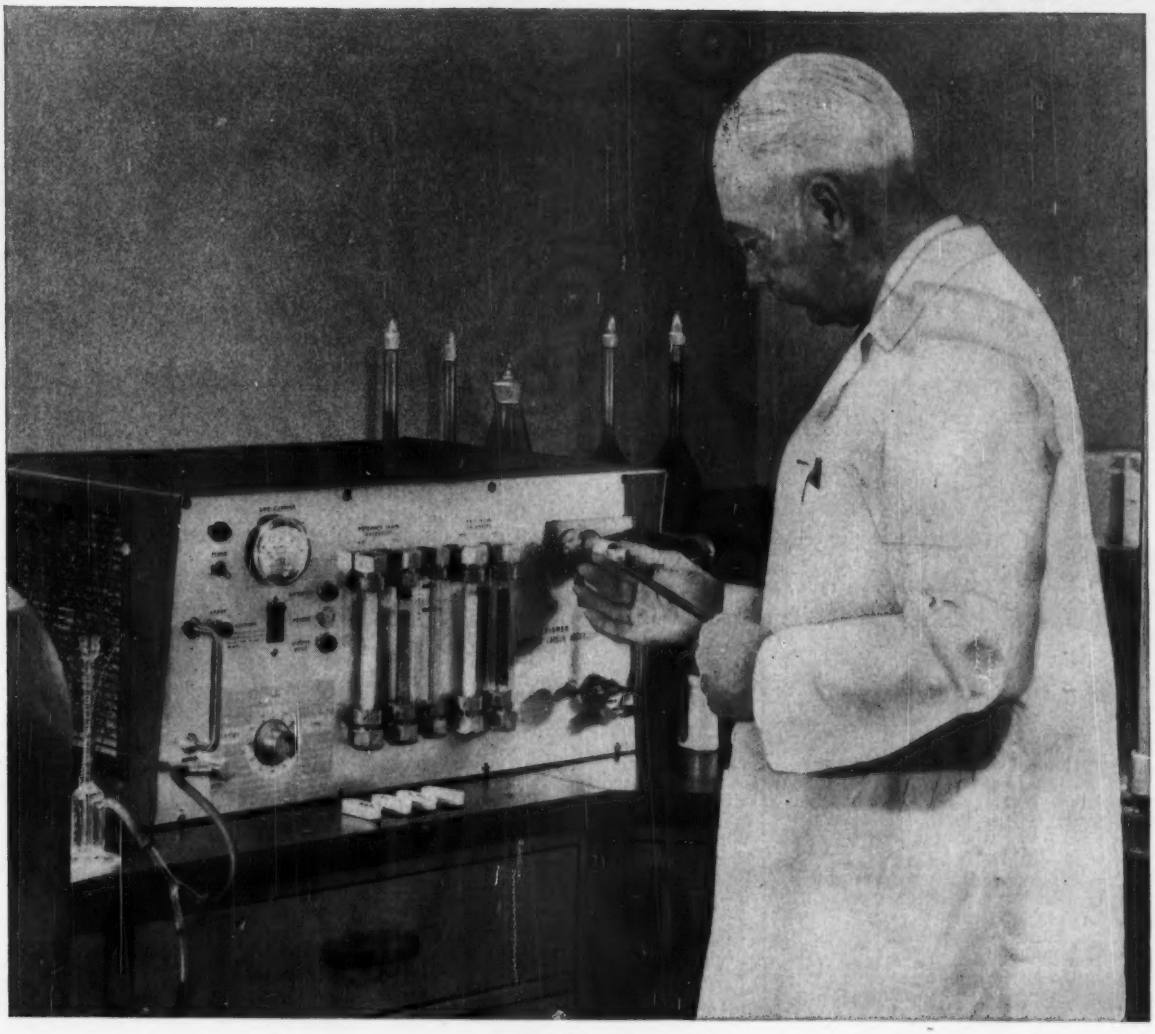
Emanuel said, "More and more discoveries in chemistry are being made in Soviet laboratories that have no precedent abroad. It is important that the Soviet Union protect the priority of these inventions." He called on Russia's State Committee of Inventions to protect rights of scientists and those of the government to these innovations.

Other problems: coordinating rapidly expanding research, quickly putting research results to practical use. Emanuel disclosed a plan, now under government consideration, to reorganize chemical research, using "brigades" for certain projects. These teams would carry research through to ultimate application. They would consist of scientists, planning executives, factory engineers and "specialist-organizers" from the State Committee on Chemistry and the State Scientific Technical Committee. A specialist-organizer having both theoretical and practical background would manage each team until completion of the project.

Some 1,400 papers presented at the Congress reflect the rising flood of Russian technology. Research in metals, polymers, chemical kinetics, radiochemistry, biochemistry, free radicals, atomic energy, chemical equipment and fertilizers were among the subjects discussed before 2,000 delegates and observers from 19 countries.

Nobel Prize winner Nikolai Semyonov disclosed that "astonishing properties" of certain polymers have been discovered with the help of paramagnetic resonance instruments, and that polymers possessing semiconductor properties have been uncovered.

Academician Semen Volfkovich reported that new, highly concentrated fertilizers containing practically no useless components have been developed in the U.S.S.R. They contain five to six times the nutritive value of conventional fertilizers, are polymeric, won't wash out of the soil and



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B-95

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Advanced research and development efforts by Lockheed are already producing significant contributions to the advancement of scientific knowledge in physical chemistry.

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RESEARCH

are easily assimilated by plants, Volfkovich says.

Polymers have a high priority in future Soviet research, according to Victor Fedorov, chairman of the State Chemistry Committee. In his opening address at the Congress, he pointed out that this branch of chemistry "has been placed on a firm scientific basis," as a result of work of "such theoreticians as Semyonov."

Under a new seven-year plan, the Russians will be pushing studies in other high-priority fields, too (e.g., controlled thermonuclear reactions). Western nations' emissaries to the Congress, returning to their respective countries this week, feel they've been handed a warning as well as a scientific challenge.

EXPANSION

• National Spectrographic Laboratories, Inc. (Cleveland), will build a new $100,000 spectrographic laboratory and sales office in Hialeah, Fla. A nuclear chemical laboratory and library of standards will also be housed in the building, which is expected to be completed and in operation by early summer.

• A new, eight-story building to house Eastman Kodak Co.'s research physics division is now under construction at Rochester, N.Y. Expected to be ready for use in '61, it will release additional space in the main research buildings at Kodak Park for the chemistry and applied photography divisions.

• Solar Testing Service (Fort Lauderdale, Fla.) has set up accelerated testing facilities at Broward County International Airport, will supply monthly reports on plastics, rubber, textiles, etc., which are submitted for exposure tests.

• June 2, Hooker Electrochemical Co. will dedicate its $3.8-million research center on Grand Island, Niagara Falls, N.Y.

PRODUCTS

Carbide Entry: GRB silicon carbide, produced at a new pilot plant (*CW Technology Newsletter, Feb. 14*) of The Carborundum Co. (Niagara Falls, N.Y.), is a new lightweight material featuring high thermal shock and erosion resistance. It is 60-90% silicon carbide by weight and 10-40% solid, granular graphite. Carborundum says it shows promise in rocket nozzles, nose cones and similar uses.

•

Cancer Probers: Mann Research Laboratories (New York) is now offering nine substituted boronic acids for use in cancer research. The compounds are preferentially absorbed by abnormal cells, permit their destruction by radiation.

•

New Standard: A new standard sample of nickel oxide powder is now available from the National Bureau of Standards (Washington 25, D.C.). Analyzed and certified for nine minor and trace elements, the standard is intended for checking and calibrating spectrochemical and chemical methods employed in the analysis of high-purity nickel, particularly electronic-grade and electrolytic nickel.

•

Price Change: Effective July 1, all American Petroleum Institute standard samples of hydrocarbons, organic sulfur compounds and organic nitrogen compounds will be advanced to a uniform price of $65/unit. Orders for the samples go to Carnegie Institute of Technology, Chemical and Petroleum Research Laboratory (Pittsburgh 13, Pa.).

•

Intermediate: Aceto Chemical Co., Inc. (Flushing, N.Y.), offers 2, 6-xylidine as a new intermediate suggested for use in food colors and pharmaceuticals and as a fuel additive.

•

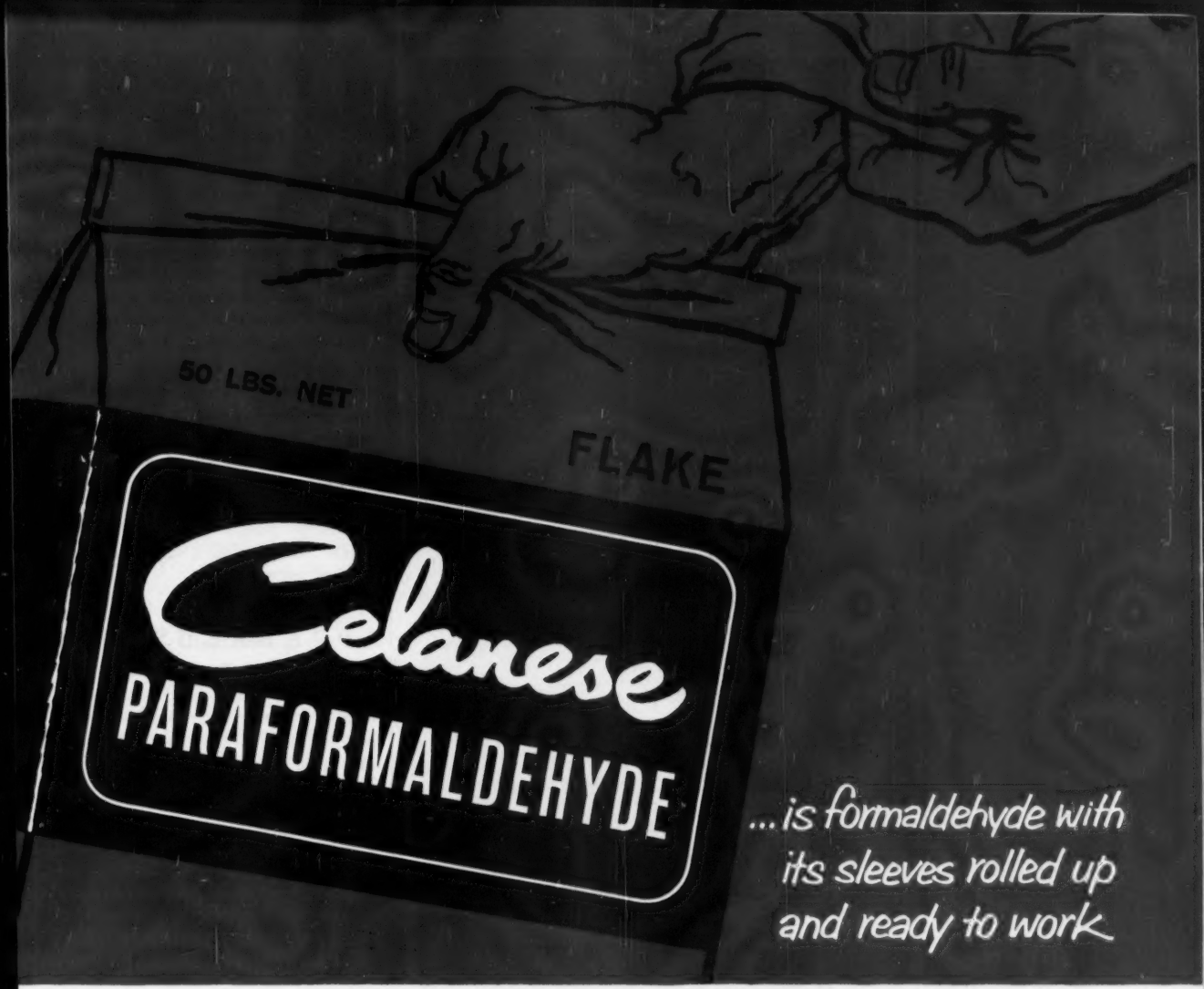
Fluoride Reagent: Rapid (15-30 minute) sensitive colorimetric determination of fluorides is achieved using lanthanum chloranilate, now available from Fisher Scientific Co. (Pittsburgh).

•

Fungus Fighter: Production of griseofulvin, a new oral antifungus drug, is under way at Britain's Glaxo Co. The antibiotic, named Grisovin, is made by a fermentation process patented by Glaxo, which is now negotiating manufacturing licenses with other pharmaceutical companies. The drug is reportedly effective in treating ringworm and other chronic fungus diseases.

•

Peroxide Catalyst: Lupersol Delta, a new methyl ethyl ketone peroxide, is offered by the Lucidol Division of Wallace & Tiernan Inc. (Buffalo,



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RESEARCH

N.Y.). It reportedly hardens polyesters 50% faster than competitive peroxides.

•

Tough Tubing: A new flexible polyamide tubing that can be used continuously in an oxidizing atmosphere at temperatures up to 225 F is now available from The Polymer Corp. of Pennsylvania (Reading, Pa.).

•

Gel Entry: Schwarz Laboratories, Inc. (Mount Vernon, N.Y.), now offers the first of a planned series of thiolated proteins, called Thiogel-20. The product is thiolated gelatin—gelatin in which the addition of free sulfhydryl groups enlarges the molecular structure and results in new physical properties.

APPARATUS

Bond Strength Tester: W. C. Dillon & Co. (Van Nuys, Calif.) has combined a dynamometer with a screw jack to form a new instrument for measuring the bond strength of a variety of materials.

•

Low-Temperature Thermometers: Temperatures as low as —57 C can be measured using H-B American Instrument Co.'s (Philadelphia) mercury-thallium thermometers.

•

Microfilter: The latest entry of the Millipore Filter Corp. (Bedford, Mass.) is a thin plastic screen filter with 50 million capillary pores per square cm. The firm reports the filter will retain all particles larger than pore size, is made in 10 porosity grades.

LITERATURE

Patent Searching Timesaver: Picturesort Co. (Newark, N.J.) is out with a weekly publication, "Patent-Dex Reporter," which reports—in one line of type for each patent—new patent number, class, invention, inventor, assignor and date of issue. The patents are listed by class.

Russian Petroleum Abstracts: The American Petroleum Institute (New York) is preparing abstracts of current important Russian petroleum articles in a biweekly bulletin "API Abstracts of Soviet Petroleum Technology." The institute hopes to cut the time lag (now approximately one

MgO spells opportunity

IMC reports on another outstanding property of its new High Purity MgO—remarkable heat resistance.

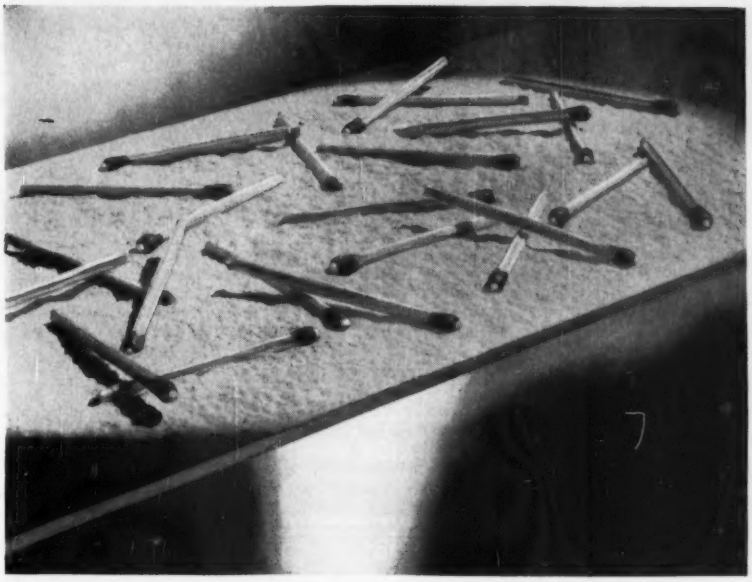
For many years, International's potash mining and refining operation at Carlsbad, New Mexico, has been producing large amounts of by-product magnesium chloride brine in conjunction with potassium sulfate. We are recovering values from this magnesium chloride by thermal decomposition to produce magnesium oxide. The product is better than 99% pure — highest purity ever achieved in carload lots.

Unbounded application

Heat resistance is one standout property. As a result, a firm is presently experimenting with it to develop a rocket nose cone capable of re-entering the earth's atmosphere. Another of its chief virtues is ease of handling, due to its low hydration rate.

Using MgO as an addition or substitution, many chemical process industries have been able to impart desirable — and hitherto unattainable — properties to their products. To elaborate:

- Improving the physical and chemical characteristics of magnesia has resulted in substantial savings. Using MgO as an extender, it's possible to obtain a high purity blend at low cost.
- Chemical manufacturers are making high-purity magnesium salts and chemicals from International magnesium oxide because of its relatively low cost and easily controlled reaction rates.
- By replacing ordinary alkali precipitants with MgO, several plants have been able to increase their process efficiency and reduce production costs.



Among its other applications: Electric furnace fusion for high temperature applications . . . in high-grade ceramic and glass formulations . . . for acid neutralization and uranium ore treatment . . . in thermocouples . . . as a substitute for alumina. Due to its low boron content, this International product has been the main source of MgO for U.S. Atomic Energy Commission applications. And the limits of its potential are nowhere in sight.

Send for a sample

If you're interested in the possibilities of high-purity MgO in your operations . . . if you detect promise for its use as a replacement material or in an entirely new application — use the coupon below. Our research staff is prepared to explore end-use problems with you. We will be happy to furnish adequate samples for experiment, and to supply technical assistance where required.

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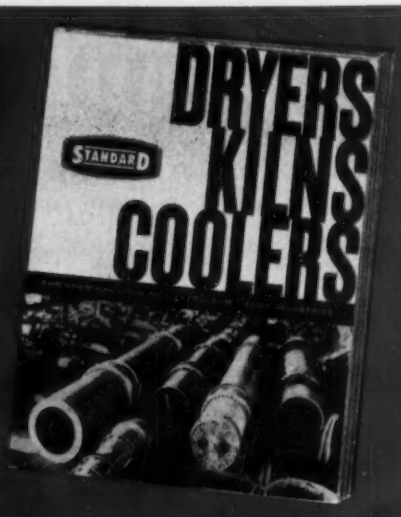

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RESEARCH

year) between publication by the Russians and dissemination of a U.S. translation.

Rare-Earth Data: A new data sheet of properties and prices of rare-earth metals is available at no cost from Nuclear Corp. of America (P.O. Box 431, Burbank, Calif.).

Novel Compounds: A new listing of novel compounds currently under market development is available free from American Cyanamid's market development department (30 Rockefeller Plaza, New York 20, N.Y.).

Trypsin: "Further *in vivo* Observations with Radioactive Trypsin," an article available from Nuclear Science and Engineering Corp. (P.O. Box 10901 Pittsburgh 36, Pa.), discusses systemic effects resulting from the administration of small quantities of trypsin to laboratory animals.

REPORTS

These reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

- "Report of the Joint Program of Studies on the Decontamination of Radioactive Waters" (ORNL-2557, $1). It was prepared by The Public Health Service and Oak Ridge National Laboratory.
- A bibliography of world literature on the production and control of artificial atmospheres for living organisms is categorized under such topics as: carbon dioxide, electromagnetic (including cosmic) radiation, oxygen, toxic substances, water and moisture control. Order "Historical Survey of Inhabitable Artificial Atmospheres" (PB 151277, $3).
- A new rapid tanning process that may greatly reduce the leather industry's dependence on imported vegetable tanning extracts is described in "Tanning Heavy Leather with Aldehydes" (PB 131965, $2). Particular success is noted in the use of formaldehyde, glyoxal and glutaraldehyde. The processes reportedly avoid the danger of drawn or cracked grain, will fully tan the heaviest steer hides overnight.
- A "Reference Index of Current Protective Coatings Specifications" (PB 151166, $3), describing the federal, military and contractor specifications of coatings used in aircraft, paints, metal platings.

INVITING NOMINATIONS FOR THE

1959 Glycerine RESEARCH AWARDS

FIRST AWARD . . . $1,000

SECOND AWARD . . . $300 ***THIRD AWARD . . . $200***

These annual awards were established in 1952 to recognize research leading to new and improved applications of glycerine and glycerine derivatives. Award winning work may deal with the chemical, physical or physiological properties of these materials; with actual or projected uses; or with scientific principles likely to stimulate future applications. Originality in extending the usefulness of glycerine into new fields will receive special consideration.

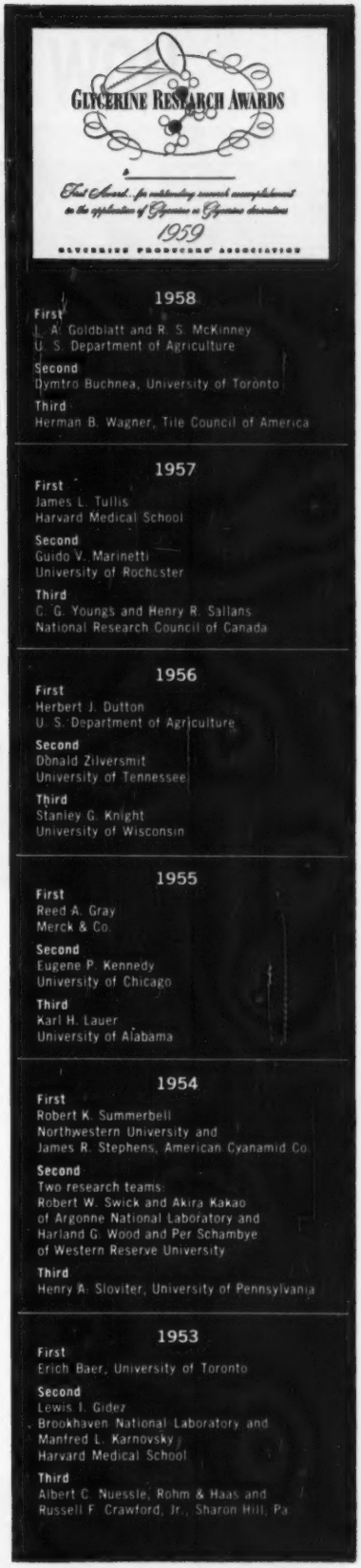
BASIS OF ENTRY – These awards are open to any individual in the United States or Canada engaged in research, either in industry or with government or educational institutions. Entries by research teams of two or three associates are eligible.

First consideration will be given to work which has come to a clear-cut point of accomplishment during the current year; but work carried on in previous years, the significance of which has been confirmed by commercial application in 1959, also will be eligible.

Entries will be judged by a committee of three persons of outstanding reputation and scientific background, having no connection with the Association or its members.

METHOD OF NOMINATION – Nominations must be made on the official entry blank, which may be obtained by writing to: Awards Committee, Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

All nominations for the 1959 awards must be received by November 1, 1959 to be eligible.



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CHEMICAL MATERIALS FOR INDUSTRY

G59-3

Corvette sports car market sets the pace for reinforced isophthalics polyesters.

Isophthalics Drive for Plastics Markets

During the next 12 months, isophthalic-type unsaturated polyesters will make an all-out bid for a big share of the reinforced-plastics market. Since the esters may make sizable inroads into existing markets of comparable phthalic anhydride-based polyesters, the industry's marketers are now trying to evaluate isophthalic's potential impact.

Because the acid is now on the threshold of its initial big push, trade opinions about its future vary greatly. Some superoptimistic isophthalic boosters talk about isophthalic's good chance of taking over 90% of all unsaturated polyester markets in the next two years. Far more conservative—and at this point probably more realistic—are guesses that these materials will at best pull in some 10-15% of the total market in the next three to five years.

Nevertheless, it's already clear that isophthalic is a significant factor that the industry will have to reckon with in the next few years.

Auto-Boat Target: Clearest indication of the acid's potential is already evident in the auto and boat market, as exemplified particularly by activities of Robert Morrison's five reinforced-plastics molding companies.* His plants turn out the all-plastic body of Chevrolet's Corvette (*see photo*), reinforced-plastic boats, and truck cabs.

The automotive field is currently the largest outlet for isophthalic resins. Morrison's utilization of matched metal dies, for high volume production, is greatly responsible for the growth of this field. And in this type of fabrication, isophthalic's properties —viz., short cure time, low crazing— are reported to be superior.

Morrison estimates his plants used about 4 million lbs. of isophthalic polyester resins in '58, although they cost more than competitive resins. His organizations' isophthalic resin requirements will likely exceed 6 million lbs. in '59, might climb to 9 million lbs. by '60, according to Morrison.

The Morrison plants are not, of course, the only current users of isophthalic resins, especially in manufacture of boats (made at Molded Fiber Glass Boat Co.). Several West Coast boatmakers are also reportedly using the iso materials. Among Eastern boatmakers there's no large-scale use of them now, but some manufacturers say the new resins are undergoing lab tests.

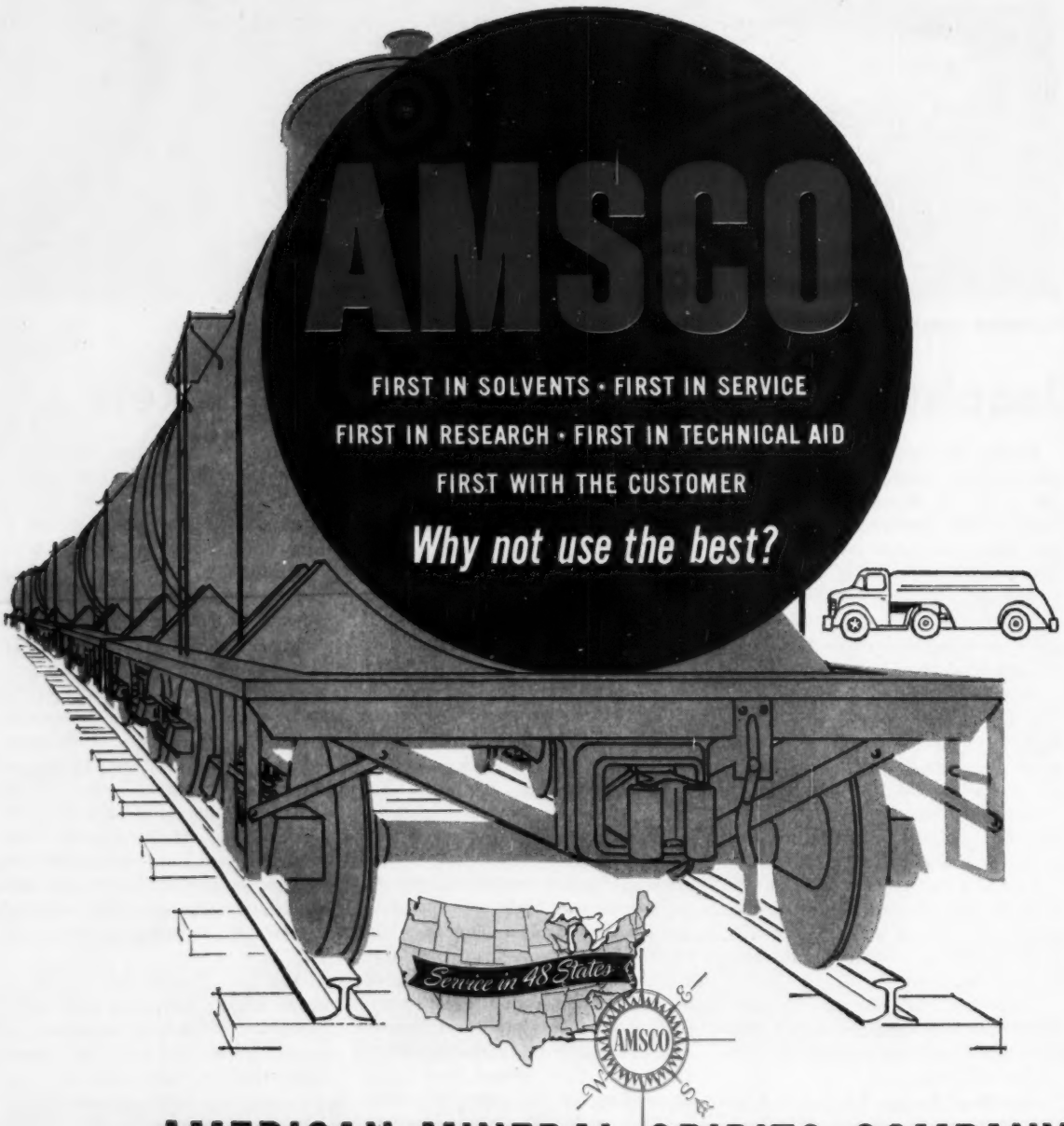
*Molded Fiber Glass Co., Molded Fiber Glass Body Co., Molded Fiber Glass Tray Co., Molded Fiber Glass Sheet Co., Molded Fiber Glass Boat Co.

Phthalic to Buck: While reports by users indicate that isophthalic resins have highly desirable properties, the new materials will have to battle for phthalic's existing markets.

Right now, the isophthalics are selling at premium prices. Exact price comparisons are difficult to make, but users point out that the lowest current tabs are in the 34-36¢/lb. range, while lowest quotes for phthalic resins are slightly lower—about 33¢/lb. Whether producers of isophthalic resins can eliminate the gap and maintain equivalent costs—especially if the phthalic makers choose to fight back with lower tabs—is a point on which neither side is willing to commit itself.

The price battle has, in fact, already begun. Early this year, major producers of phthalic anhydride cut prices across-the-board by almost 20% (*CW Market Newsletter, Jan. 31*)—a move unofficially admitted to be a blocking action against Amoco Chemical's promise of low phthalic prices when its new plant comes on-stream this year.

FIRST in sales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Market Newsletter

CHEMICAL WEEK
April 18, 1959

A fluorspar fracas is heating up Washington's Capitol Hill. Proposed legislation to slap curbs on imported fluorspar has potentially broad ramifications for the CPI as a whole. It's viewed as a test case; if the bill passes, it will help to erect protective barriers against many other imported minerals and metals.

The fluorspar bill, patterned after the sugar act, would divide domestic markets—based on annual consumption estimates—between U.S. and foreign suppliers. It's the formula that mining-state legislators hope to apply to other commodities, including lead and zinc.

Government witnesses oppose the bill, arguing that it would derail the Administration's foreign trade policy, lead to government control of domestic mineral producers. Lining up with the U.S. Interior and State departments are many big fluorspar users who oppose any move that would boost mineral prices. Aluminum, steel and chemicals spokesmen are trying to talk the bill down.

But Congressional pressure is strong. Almost all domestic producers of nonferrous metals and minerals are quietly putting political pressure on congressmen to vote for the sugar-act approach, in the hope it will snowball to cover many other products. Lead and zinc interests are at the head of the long list. They are also asking tighter import quotas under the existing program the White House adopted last year after Tariff Commission approval—a move bluntly resisted by Administration officials.

The Senate Interior Mineral Subcommittee in charge of the fluorspar bill plans a tough fight, will try to embarrass the Administration for opposing mining industry supports it proposed itself last year, and will charge fluorspar users with collusion in lining up opposition in bigger industries, i.e., steel, aluminum, chemicals.

•

Meanwhile, the government-imposed curb on lead and zinc imports (*CW, Market Newsletter, Oct. 4, '58*) shares the blame for the closing down of American Smelting's lead smelter at Alton, Ill. Asarco President J. MacKenzie says quota restrictions made it impossible to obtain adequate ore supplies. Another reason for the plant's closing: termination of a smelting contract between Asarco and St. Joseph Lead—long Asarco's major customer.

•

A purchase of 12.5 million lbs. of 75% wettable DDT by UNICEF (United Nations Children's Fund) has been split three ways among these firms: Allied Chemical International got the largest order—6.11 million lbs., worth over $1.5 million; Montrose Chemical Corp. of California is supplying 4.8 million lbs., worth $1.25 million; Geigy Chemical was awarded a contract for 1.53 million lbs., worth almost $384,000.

UNICEF will use the pesticide in the worldwide antimalaria program—a mammoth job it shares with the International Cooperation Assn. Each organization makes its own purchases, sends the pesticides to specific areas of the world.

Far bigger purchases of DDT for distribution by the International Cooperation Assn. have been made by the government's General Services Administration since last November (*CW Market Newsletters, Dec. 6, '58; Feb. 21*). A total of almost 46.15 million lbs., worth about $11.79 million, were purchased up to April 10. These firms shared the market:

Allied Chemical International	3,129,000 lbs.
California Spray Chemical	1,418,000
Diamond Alkali	6,129,600
Geigy Chemical	1,000,000
Lebanon Chemical	3,625,000
Michigan Chemical	180,400
Montrose Chemical of Calif.	17,093,000
Olin Mathieson	10,570,000
Pesticide Export Co.	905,000
Pittsburgh Plate Glass (Corona Chemical Division)	2,100,000

GSA has also purchased 709,500 lbs. of dieldrin formulations (paying $855,312) for the program. The 75% wettable dieldrin powder is used in areas where insects have become immune to DDT. Purchases up to April 10 were from two suppliers: Stauffer Chemical, 432,500 lbs., worth $519,000, and Koahoma Chemical, 227,000 lbs., worth $336,312. (Dieldrin is made by Shell Chemical, which, however, does not formulate.)

•

Glass carboys aren't out yet, despite the rough competition from plastic shipping containers (*see p. 46*). Arrowhead and Puritas Water Inc. (Los Angeles) last week made its first shipment of 13-gal. glass containers that will be distributed by United Box Lumber (Newark, N. J) which makes the encasing boxes.

SELECTED PRICE CHANGES — WEEK ENDING APRIL 13, 1959

	Change	New Pri
UP		
Corn oil, foots acid 95%, tanks	$0.0025	$0.062
Cottonseed oil, refd., tanks	0.00125	0.14¢
Mercury metal, 76 lbs. per flask	9.00	236.00
DOWN		
Linseed oil acids, water-white, dms.	0.003	0.22
Tallow, edible, tanks	0.0025	0.09

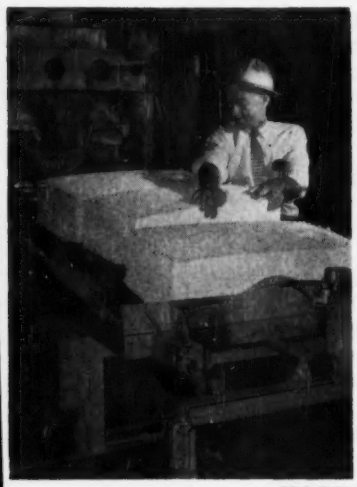
All prices per pound unless quantity is quoted.

Oronite Chemical promptly tacked an isophthalic price cut to the phthalic notification, brought tabs down 30%, to 15.2¢/lb. in carloads. (Reduced-price phthalic was selling for 16½¢/-lb. in tank cars, 17¢ in carloads.)

Within a week, the phthalic price drop was reflected in an industry-wide shaving of polyester resin tags (*CW Market Newsletter, Feb. 7*).

Producers of phthalic resins have, of course, the very real advantage of prior acceptance of their products by consuming industries; the long-term familiarity of molders with properties of these resins can't be discounted. Considerable promotional work by iso-resin boosters will be needed to overcome this handicap.

The educational problems that must be surmounted by isophthalic

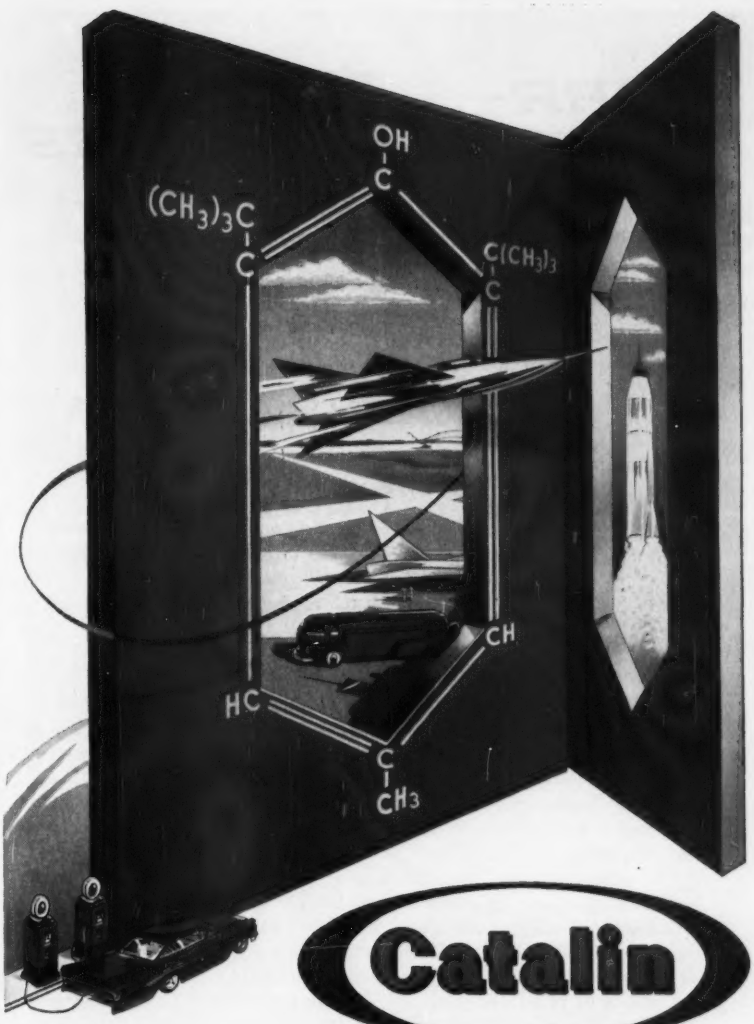


WIDE WORLD

New Rubber Rolling

Polyisoprene rubber — man-made duplicate of tree-grown material — rolls off the baler (*above*) at Shell Chemical's plant in Torrance, Calif. The new synthetic rubber, now offered on a commercial basis, is priced competitively with natural rubber. It has been adopted by U.S. Rubber Co. for the production of truck tires, is going into the popular 7.50-20, size now being manufactured at U.S. Rubber's Los Angeles plant.

Isoprene rubber is not expected to replace natural rubber. But its commercial availability allays fears of shortages, also helps stabilize the price of natural rubber.



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Catalin ANTIOXIDANT CAO-1 stabilizes high-octane automotive gasolines, as well as turbine, insulating, hydraulic and transformer oils . . . in fact, nearly any petroleum hydrocarbon exposed to oxidizing conditions.

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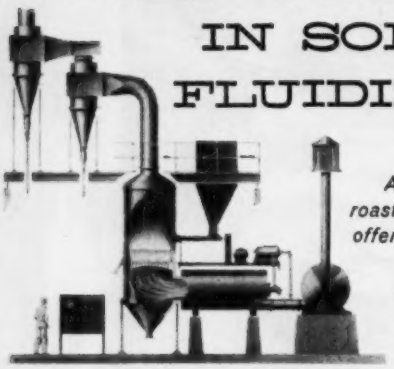
WHAT'S NEXT IN SOLIDS FLUIDIZATION?



A versatile drying, roasting and calcining technique offers opportunities in chemical processing. Here's a report on developments.

Since Dorr-Oliver first introduced the fluidization technique for non-catalytic applications more than ten years ago, our engineers have been constantly investigating its wide potentialities. From such well established operations as the roasting of sulphide ores, SO_2 production for acid manufacture, drying of fine coal and drying and sizing of lime stone, development is now extending into many fields of chemical processing.

The advantages of FluoSolids®, Dorr-Oliver's system for fluidized bed techniques, are its essential simplicity, its compactness, its low operating and maintenance costs, its ability to take wide feed variations and its inherent adaptability to precise temperature control with simple instrumentation. It has proved particularly effective in drying wet, sticky or otherwise difficult-to-handle materials. In some drying operations, the added benefit of classification by particle size is possible.

At D-O's research and development center, Westport, Connecticut, hundreds of test runs covering many possible new applications have been completed. Typical of these are the drying of heat sensitive polymers, hydrochloric acid and sodium sulphate production by the Hargreaves Process, drying of sodium chlorate crystals and potassium silicon fluorides, drying of chemical precipitates, roasting of furfural residues, and low temperature calcination of phosphates. Opportunities for still further development are far from exhausted.

To sum it up: if you want a continuous, high capacity method of drying or heat treating materials . . . if precise and completely uniform temperatures are needed to prevent, induce, or control chemical or physical action . . . if intimate contact of gases with solids is a necessary part of your processing . . . maybe the Dorrco FluoSolids System is your answer.

Chances are that our engineers have already been working on just such a problem as yours. If they haven't, the information and experience now available should at least provide a good starting point for investigation and evaluation. An inquiry costs nothing — and it may open up mutually rewarding opportunities. Dorr-Oliver Incorporated, Stamford, Connecticut.

Dorr-Oliver offers a wide range of equipment, methods and complete systems for the processing industries. Operations include:

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marketers are complicated because, even though adaptation of molding procedures to handle iso resins may be relatively easy, manufacturers will in most cases want to run time-consuming performance tests. This fact alone may prolong considerably the time needed to push isophthalic resins into the "big time" market foreseen by their optimistic proponents.

Favoring phthalic's continuing strength in the resin market is the fact that many resin makers have their own captive phthalic anhydride plants. Makers of isophthalic-type resins must now buy the isophthalic acid raw material from only one U.S. producer — Oronite — but Amoco's new plant will soon become a second source.

Although some manufacturers of phthalic anhydride resins also offer isophthalic polyesters, their largest investments are in phthalic products. Moreover, phthalic is still in oversupply. Consequently, there's no evident desire on the part of these manufacturers to compound their market problems by pushing too hard another type of material, viz., isophthalic resins.

The future of isophthalic resins in terms of the total unsaturated polyester resin market is still replete with unpredictable factors. Few will deny that iso materials have good, promotion-worthy properties that may well push them into "big time" markets. But how soon and to what extent these markets will open won't be accurately predictable until the iso ball is rolling a little bit faster.

More Scrap Aluminum

U.S. secondary aluminum capacity will be upped another 36,000 tons this week as American Smelting and Refining Co.'s (Asarco) new plant at Alton, Ill., goes into volume production. The new smelter, largest built specifically for the conversion of aluminum scrap into alloy ingot, replaces the company's old plant at Detroit.

Smelting and alloying operations will be handled by four 40-ton and one 15-ton gas-fired reverberatory furnaces, all convertible to oil if required. Scrap materials for the operation will come from industrial stampings, borings and turnings from machine operations (classified as new

scrap), as well as discarded household utensils, automotive and appliance parts (old scrap). Special equipment has been installed to remove contaminants such as iron, zinc, stainless steel, nickel, copper and magnesium, as well as substances such as plastic, wood, glass, etc. Removal of these impurities will simplify the formulations of alloys.

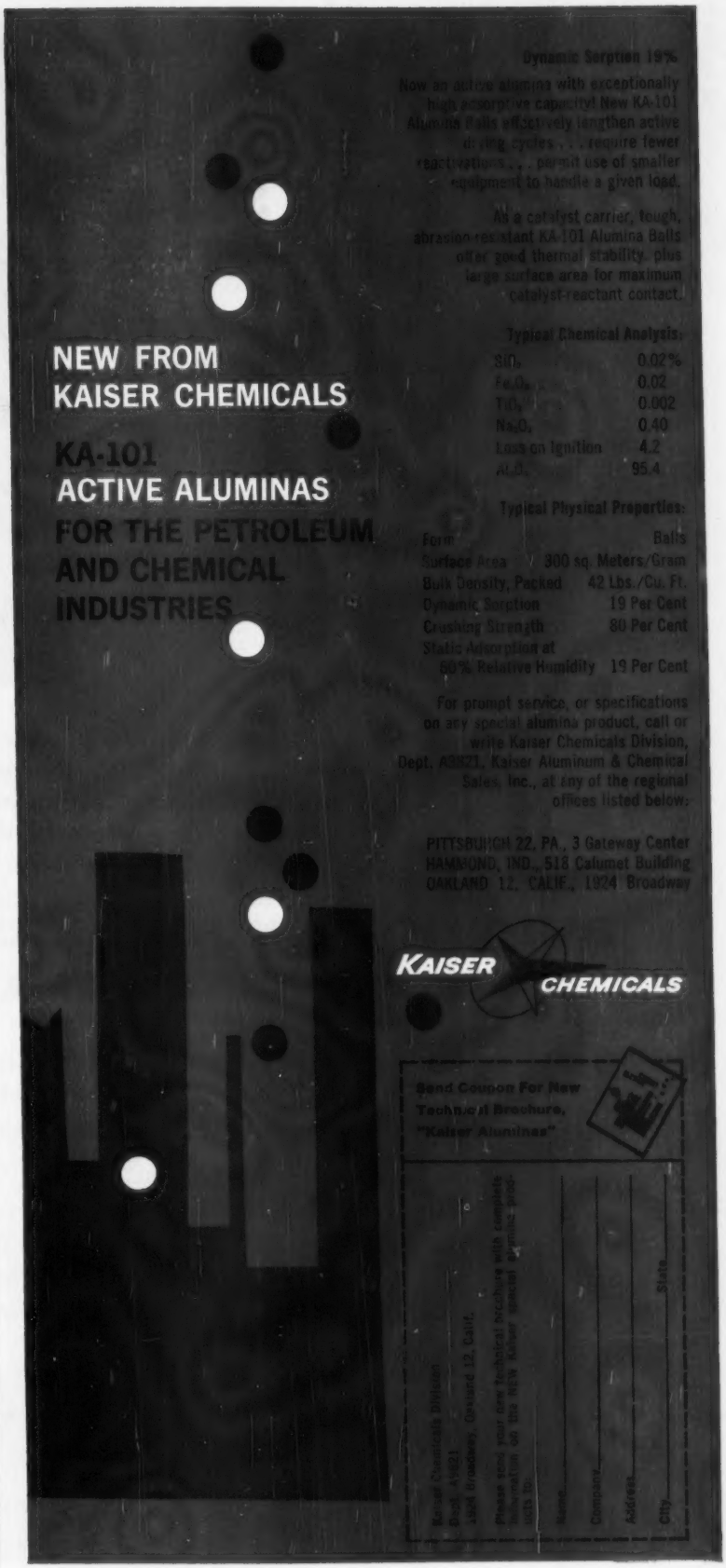
Shakedown operations for the plant were started the latter part of last year; and by the end of March, all five furnaces were producing. Coincidental with the new plant's startup, plans for the gradual shutdown of the company's older and smaller Detroit plant were put into effect. Asarco's gradual changeover was necessary to maintain adequate supplies for the company's present customers. The Detroit plant is now being dismantled.

Asarco has two other smelting plants, one on the East Coast at Perth Amboy, N.J., and the other on the West Coast at Los Angeles. The new plant will have its primary market in the Midwest, particularly the heavy industrial and automotive areas around Detroit, Chicago and Cleveland. Field warehouses will be placed at Detroit and Whiting, Ind. Stocks will also be maintained at Houston, to supply the southwestern U.S. Sales of the alloy ingots will be handled by Federated Metals Division of Asarco.

Secondary aluminum is an important section of the aluminum industry: one industry source estimates that U.S. output of aluminum from scrap was about 378,000 tons in '58. That's about 40% of the U.S. primary output figure—about 1.55 million tons last year. Demand for secondary material is expected to continue high for the next few years. Usually, any time the primary demand climbs, the market potential for the reclaimed material improves also.

One of the largest outlets for secondary alloys is in aluminum castings. About 60-65% of these castings are made from the secondary alloys.

Although Asarco's new plant is not likely to be put into full production immediately, the company says it isn't worrying about finding markets for a sizable part of its output. But the same market questions that worry producers of the primary product—such as the threat of increasing foreign competition — cannot be ignored by scrap reclaimers.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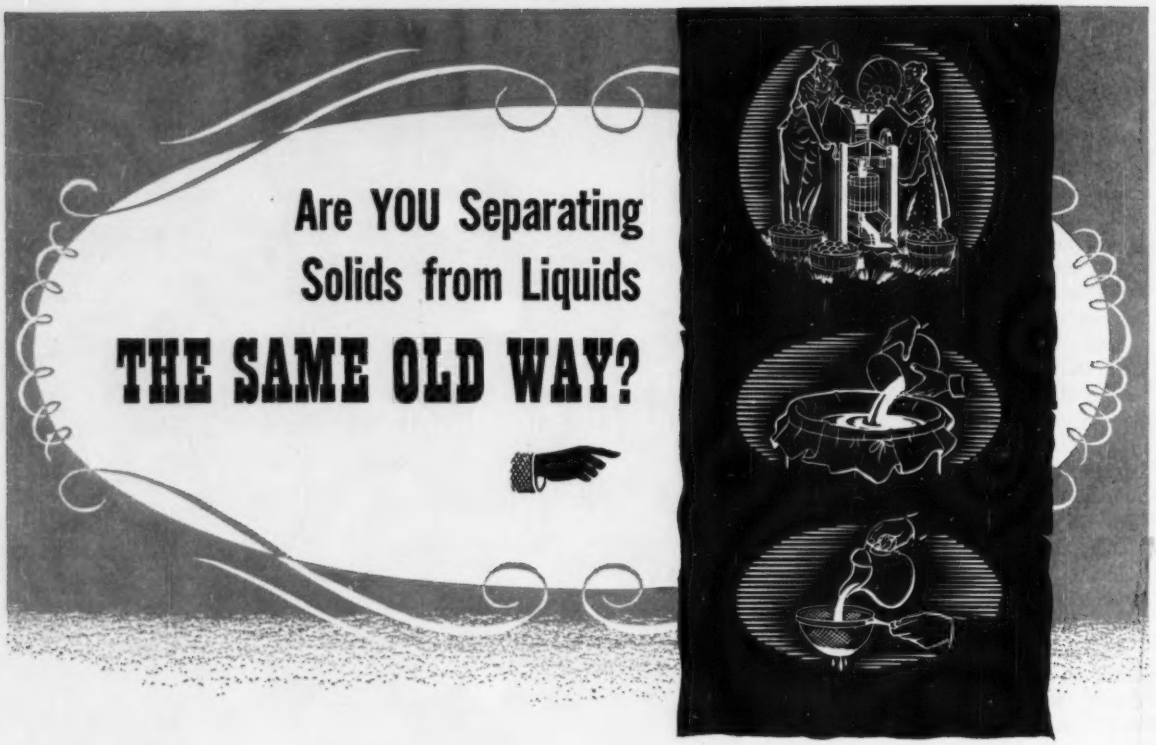

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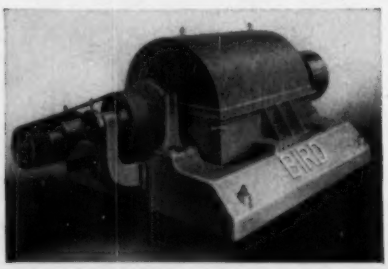

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Debating Two Routes to Pollution Control

Next week, the chemical process industries will tackle one of their knottiest problems—air-pollution-control legislation. Significant fact behind their efforts: while CPI management generally agrees that industry should help develop sound, workable pollution legislation, it doesn't always agree on the level of government (state or local) that should have pollution-control respensibility.

One view is that maximum local government control of air pollution is most effective. This view is held by Allied Chemical's Austin Heller (below), head of Allied's Plastics and Coal Chemicals Division's industrial waste development section, chairman of the firm's process waste committee, member of the Manufacturing Chemists' Assn.'s air-pollution-abatement committee and also of the American Society of Mechanical Engineers' air-pollution-control group.

His view, backed by MCA in its approach to control legislation, maintains that each localized pollution area (an area affected by the same source of pollution) is unique, should be considered by itself.

On the other hand, there's the view that the best way to approach air-pollution-control legislation is through state laws and regulations. One pollution expert who prefers this view is American Cyanamid's William Bradley. He bases his views on his experiences as chairman of New Jersey's state air-pollution-control commission. He admits that New Jersey—a heavily populated, highly industrialized area with 9,000 of its 14,000 factories concentrated in four adjoining counties—is unique, compared with some other industrial states.

Views in Action: Proponents of localized-area control will be plugging their views next week when members of ASME's air-pollution-control committee resume revision of their model smoke ordinance. According to committee secretary Fred Mallette, the ordinance is recommended as a guide for local communities, with the hope that they will make their own studies, come up with a unique, community-oriented ordinance. He admitted to *CW*, however, that the tendency had been for communities to enact the model law intact.

Some practitioners of the state-level approach to pollution control will see action next Monday at a meeting of the New Jersey air-pollution-control commission. The commission, according to Bradley, will meet to hear members of the state's chemical industry technical committee give their views on proposed new chapters for the state's air-pollution code. The chemical committee will be the fifth group to testify on the chapters that deal with dust, particulate matter and gases.

"New Jersey works closely with industry and the public," Bradley told *CW*. "No one need be afraid of state regulation of air pollution, if everyone concerned chips in and helps formulate regulations. When this is done, industry and the public—both contributors to the air-pollution problem—usually have taken all the necessary preliminary steps toward abatement before the code is completed."

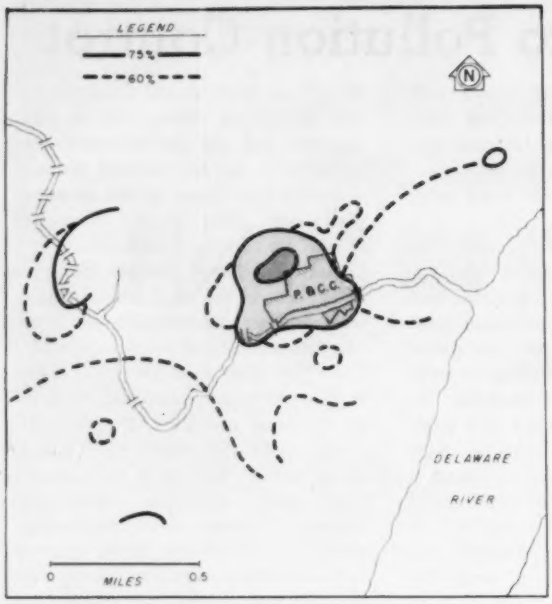
Need for Local Action: Heller is outspoken on the need for local consideration of air-pollution problems. "Pollution is a local problem," he told *CW*. "We need local facts to combat it. You can't apply universal standards to the local problems. Despite pressures, we're not ready to think in those terms. You have to consider such local factors as topography, population density and meteorological conditions, in addition to the types of contaminants present. I'm not opposed to state and federal participation in itself; but before we can agree that these techniques are preferable to local control, a great deal more basic information must be collected."

Commenting further on the consideration of local factors, Heller said that many factors contribute to the pollution problem, not all industrial. "When you publicize the results of your findings, pressures for abatement are spread more evenly among the various contributors to pollution." He cited Allied's Frankford Works in Philadelphia as a case in point. A local-condition survey carried out there was so successful the U.S. Dept. of Health expressed interest, and several CPI firms inquired about conducting

CW PHOTO—BILL MCALLISTER

Allied's Heller: 'Pollution is a local problem; you can't apply universal standards to local problems.'

Allied's odor survey: one tool for localized-area air-pollution control.



Curves called iso-frequency curves were plotted on plant-area maps to show lines along which odors were observed at a given frequency, based on total observations made.

Iso-contribution curves also were plotted in the Allied survey to show lines along which specific odors were observed at a given percentage of total odors encountered.

a similar survey for their plants. The Frankford-type survey is useful for plants located in industrialized areas where pollution might come from a variety of sources. Purpose of the survey was to determine what odors, and to what degree, were coming from the Allied plant.

"These surveys," Heller said, "often prove that the local chemical plant is responsible for only a fraction of the local odor problem. For example, in 32,411 observations made in the area immediately adjacent to the Frankford plant, odor was detected in 25,014 instances. In 24,227 of these instances, the odor was classified as barely detectable. In only 9,938 of these was the odor attributed to the plant. Of the remainder of the barely detectable odors, 11,621 were traced to nonindustrial sources, 2,668 to other industries."

In the remaining 767 cases of the 25,014 instances reported, odors were described by observers as "distinct." Only 212 of these were traced to the plant, the rest to nonindustry and other industry sources. Heller said that only one-tenth of 1% of the observations revealed odors classified as strong, irritating or intolerable (classifications 3, 4 and 5 in the survey).

To assist observers in evaluating the survey information, observations were recorded on report sheets, then transferred to tally sheets on which all odors were classified by type and intensity. This information was then plotted on area maps by means of curves called iso-frequency and iso-contribution (*see iso-graphs above*).

Survey results, Heller said, together with weather data, cued plant management for specific trouble periods and made possible installation of abatement equipment or revision of operating techniques.

The Other View: Those who take issue with the localized-area concept cite two main objections. "In the first place," Bradley said, "the technical manpower is just not available on the local level to properly direct local governments toward realistic regulations. In addition, inequality of enforcement may occur, because of local politics, community attitudes.

Despite differences in opinion on the manner in which control legislation should be brought about, most CPI spokesmen agree that process industries have done better than most to abate pollution before local or state action forced the issue. Naturally, this has not always been the case, and '59 promises to be a record year for pollution-control legislation; but, so far, the CPI record has been a good one. MCA President John Hull estimates that, according to the lowest figures received on a company basis, the industry spends $200-250 million/year on air-pollution control or avoidance (from 1% to 1½ of all production costs per company).

Bradley sums up the situation by pointing out, "It has taken a few years for the chemical industry to evaluate its pollution problem and to recognize the need to do something about it. Evaluation came about partly as the result of lawsuits and state laws. But for the most part, it came about because of the desire on the part of the industry to become an accepted member of the community. And today the CPI is a leader in air-pollution abatement."

It's too early to determine which approach—local or state—is better for promoting control legislation. But —local or state—management must see to it that industry's experience and conclusions are represented whenever control legislation is being considered.

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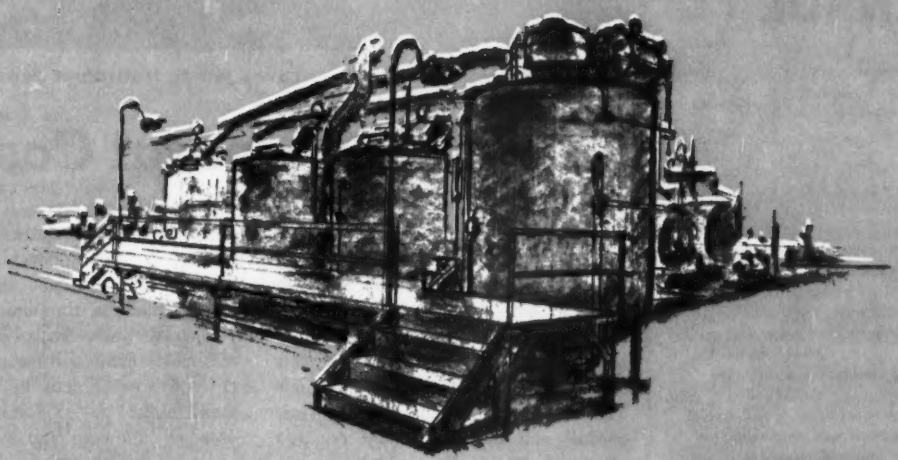

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Boiling Point..(14°F)	−10.0°C
Refractive Index	
Liquid....(I.C.T. 1, 107)....n20°/D (68°F)....	1.410
Gas (Mellor, J.W. Vol. X, 197) n15°/D (59°F).	1.000686

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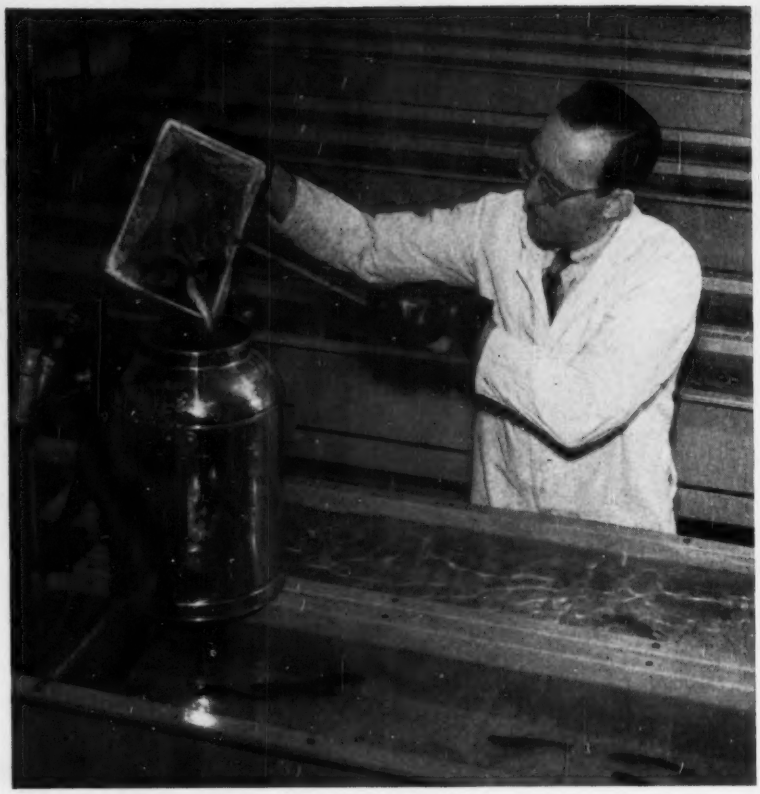

Checking water pollution: Improved waste treatment depends on . . .

Justifying Disposal Costs

Communities cannot expect any industrial firm to do much to improve treatment and disposal of wastes, unless the company can justify the high cost of such extra processing. This challenging view was presented to process management circles a few days ago by Dow Chemical Co.'s Thomas Powers, manager of waste control and utilization. But reaction of those outside the industry is yet to come.

Powers told some 300 registrants at the Eighth Southern Municipal and Industrial Waste Conference held recently at the University of North Carolina (Chapel Hill) that the key to improved waste-disposal methods is economic justification. "We must decide how much we are willing to reduce our standard of living in order to have clean water," he said.

For large firms, Powers said in the keynote address, economic justification comes from public relations benefits. When the large corporation is convinced that its wastes are creating adverse public opinion, it will respond with corrective measures. Because industry is so vulnerable to public censure and control-authority action, Powers sees "a tremendous surge of industrial waste-control activity."

Smaller firms will be able to install corrective equipment, he said, if Congress makes it economically justifiable by allowing rapid write-off of capital expenditures for such corrective equipment.

Cheaper Methods Needed: "We must devise cheaper methods to achieve the goal of clean water and make economic justification easier. One of our main problems of cost seems to stem from the fact that our wastes are so dilute," Powers stated. "Can we say that more concentrated wastes are on the horizon? I believe it is a must. Now, if smaller-volume wastes are a horizon concept, more efficient waste treatment and disposal methods will follow. The opportunities to decrease the volume of wastes are tremendous in the wet-process

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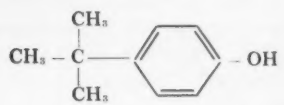

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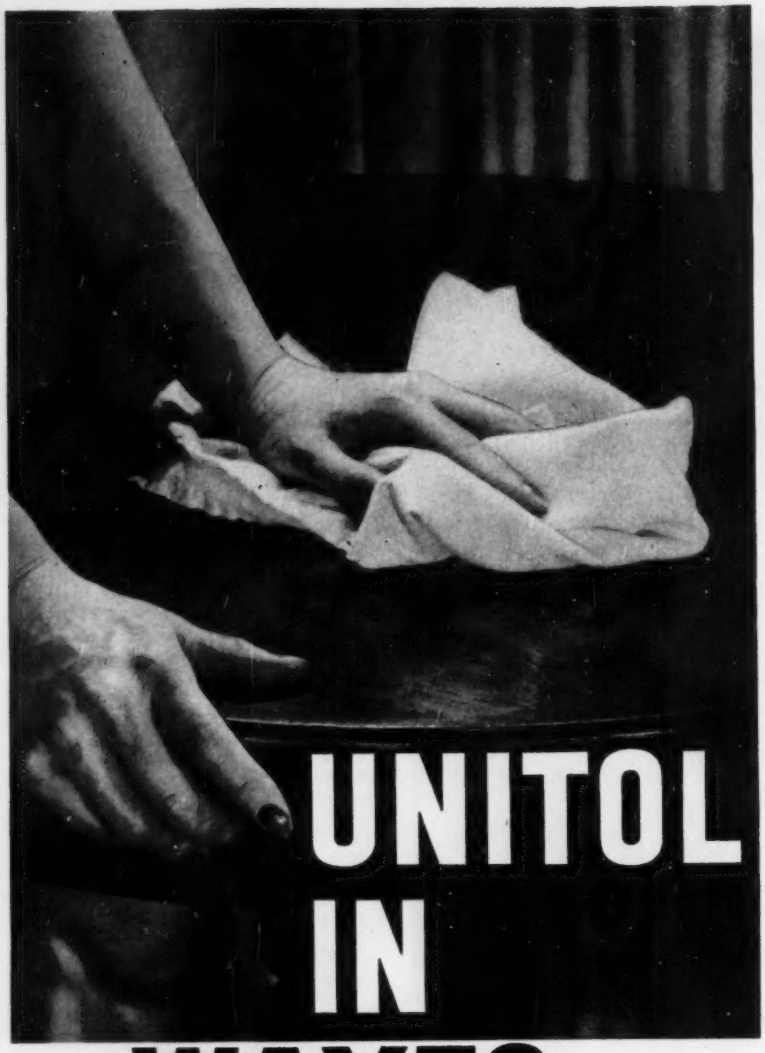

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Chemical Treatment: "When I first started in this business back in '31, we had high hopes for chemical treatment. The Dearborn, Mich., and Coney Island plants went onstream. Their costs did not seem to justify the end, and chemical treatment fell into disfavor. With the instrumentation we have available today and the improvements being made, a fully automated chemical precipitation plant of even small size is on the horizon." Defining chemical treatment as any treatment that uses chemicals to aid solids separation or oxidation, Powers said return to chemical treatment as a major process for pollution control is ahead.

He then turned briefly to disposal of radioactive wastes. To handle those wastes, he said, subsurface disposal has become a necessity in some cases. He pointed out that subsurface disposal will be more widespread in the future and that this method will demand concentrated wastes.

Despite the problem of costs, Powers foresees: an upsurge in the treatment of industrial wastes, a more careful use of water on all fronts, potable water from waste water, cheaper treatment processes by virtue of improved solids separation and less-dilute wastes, more and better incinerators for all types of wastes and expanded use of subsurface disposal. And few communities will find that objectionable.

LABOR

Organizing Drive: The international executive board of Oil, Chemical and Atomic Workers Union (AFL-CIO) has signaled an expanded organizing drive by authorizing a budget of 11¢/member/month for organizing activities, and empowering the international union to borrow up to $500,000 for that purpose. The board stipulated that half of the borrowed money must come from OCAW's own locals.

OCAW President O. A. Knight said that a substantial number of representatives would be assigned exclusively to organizing. "We will be carefully selecting a solid staff of organiz-

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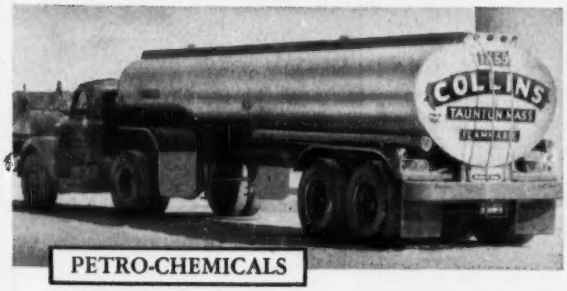

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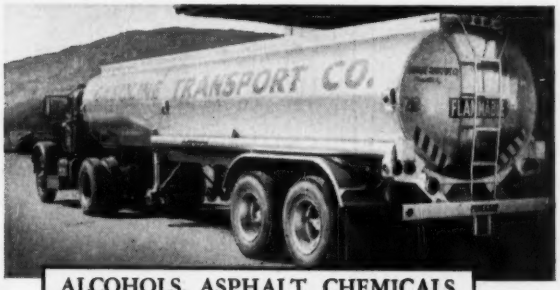

ALCOHOLS, ASPHALT, CHEMICALS

STEEL AND ALUMINUM FRUEHAUF TANK-TRAILERS are used by Gasoline Transport Company, Louisville, Ky.

CHEMICALS, HOT COMMODITIES

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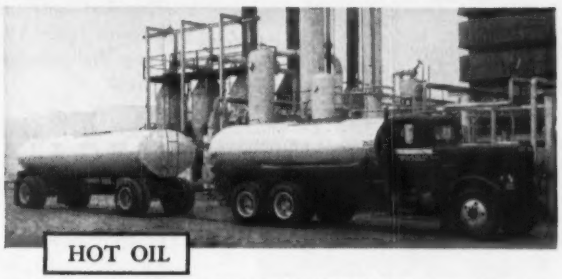

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ADMINISTRATION

ers. Some of them will be detached from present servicing duties."

"The major activity for this staff," another spokesman said, "will be concentrating on a number of key plants in all facets of OCAW's jurisdiction. Projects in this category will be long-range, with the union prepared to take the necessary time to build good in-plant leadership before petitioning for elections."

OCAW's membership is about 190,000, each member paying $2/month to the international headquarters. The organizing budget, which will not increase members' dues, will run about $20,900/month, based on current membership.

•

Picketing Prohibited: A New York state supreme court judge has blocked for at least 10 days picketing by striking union members at West Virginia Pulp and Paper Co.'s Mechanicville, N.Y., mill. At the same time, the state industrial commissioner ordered mill production stopped, told management to wait for recommendations prepared by mediators. The actions were taken to halt further violence in the long strike.

The company obtained the restraining order against picketing in the wake of a three-hour brawl when striking members of the United Papermakers and Paperworkers Union clashed with nonstrikers and police. Nonstriking workers had been operating the papermaking machines for a week.

LEGAL

'Fair Trade' Fine: E. R. Squibb & Sons, division of Olin Mathieson Chemical Corp. (New York), has collected a $1,000 fine from Berners Pharmacy, Inc. (Manhattan), for violation by the retail drug concern of a permanent "fair trade" injunction. The fine was imposed by the New York state supreme court.

Squibb has also announced issuance of six other contempt orders, and granting of 32 permanent injunctions and three temporary injunctions by the courts against alleged price-cutters in greater New York City and metropolitan areas of New Jersey. In addition, the drug firm obtained assurances of "fair trade" compliance from approximately 30 New Jersey concerns. The firms named in the six con-

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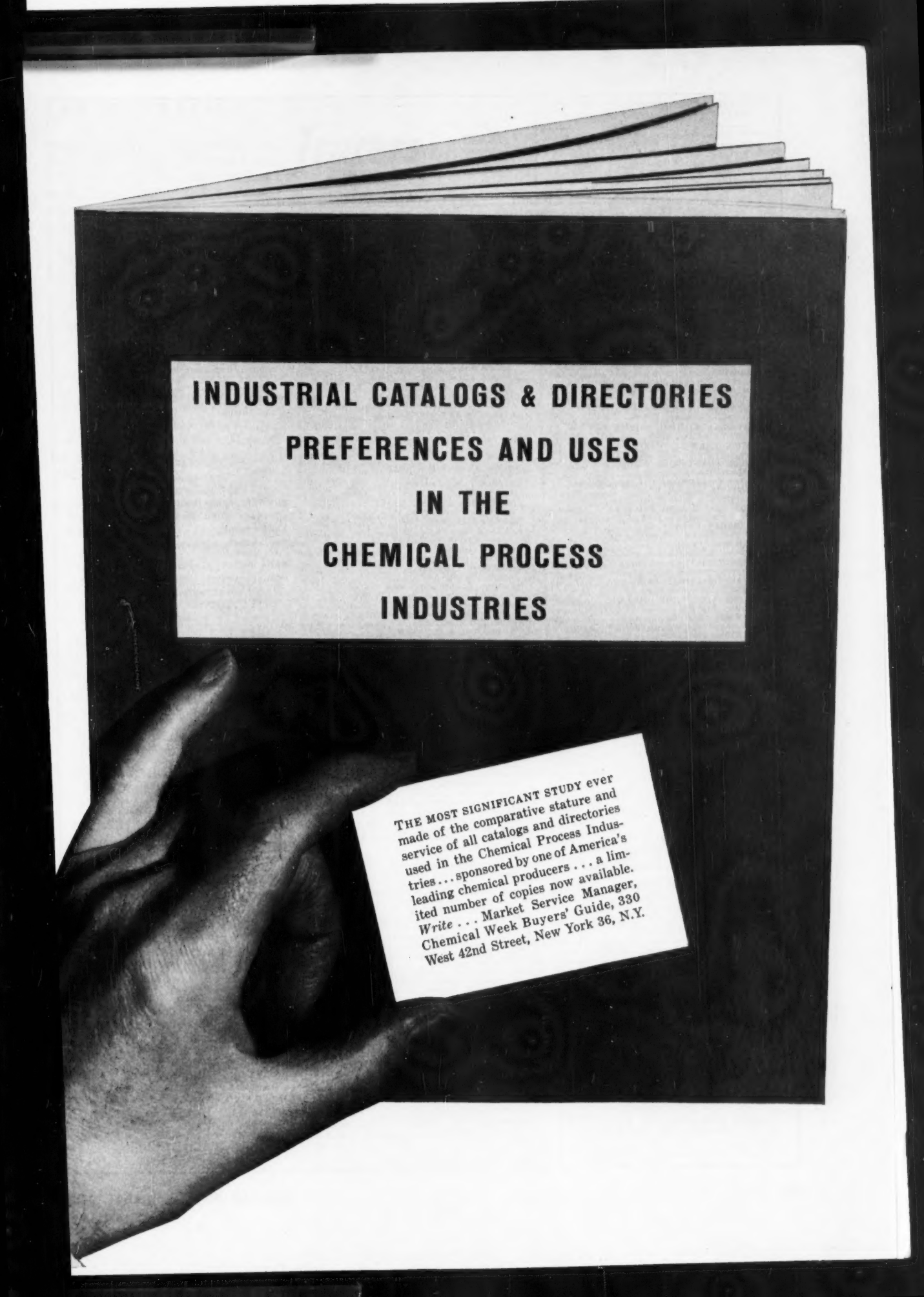
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ADMINISTRATION

tempt orders were fined, depending on the number of alleged violations, from $350 to $1,250, plus costs in some cases. Fines against the six were stayed, pending proof of subsequent price-cutting.

•

Tradename Violation: Eastman Kodak Co. and Eastman Chemical Products have filed suit in U.S. district court (New York) against Ververay Corp., charging the firm with violation of the Eastman tradename, Verel. The complaint alleges that the defendant used the tradename Vervel. The suit charges unfair competition, seeks to declare Eastman's rights to its patent, Verel, which it manufactures and sells. Verel is the tradename for a synthetic staple fiber and synthetic yarn.

KEY CHANGES

Edward J. Goett to president, Industrial Reactor Laboratories (Plainsboro, N.J.).

Robert W. Huffman to president and general manager, Solventol Chemical Products (Detroit).

Harold Lambertus to general manager, Nuclear Fuels Dept., Spencer Chemical Co. (Kansas City, Mo.).

Herbert E. Miegel to vice-president—engineering; **Donald B. Tuson** to vice-president—finance; Reichhold Chemicals (White Plains, N.Y.).

James R. Simpson to director, Kaiser Aluminum & Chemical Corp. (Oakland, Calif.).

Edmund C. Austin to vice-president—procurement, Fluor Corp., Ltd. (Los Angeles).

E. G. Higdon, L. D. Vickers to directors, American Missile Products Co. (Lawndale, Calif.).

Raymond F. Schultz to director of research and development, Copolymer Rubber & Chemical Corp. (Baton Rouge, La.).

William H. Chadbourne to director, Fiberfil, Inc. (Warsaw, Ind.).

W. H. Thompson to assistant vice-president for Europe, Overseas Division, National Aluminate Corp. (Chicago).

Robert E. Lewis, Charles D. LaFollette to directors, Sylvania-Corning Nuclear Corp. (Bayside, L.I., N.Y.).

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Operators to supervise operation and maintenance and train customers' employees in Urea Plant in Korea. Assignment for 18 months or more. Require experience in Air Separation, Partial Oxidation, Shift Converters, Ammonia Synthesis or Urea Synthesis. Also desire Technical Personnel and Laboratory Supervisors. All inquiries kept confidential. Consideration based on submission of complete chronological experience resumes to: McGraw-Hydrocarbon, 161 East 42nd Street, New York, N.Y.

Supervisor for wet process phosphoric acid and pelleted fertilizer plant. California location. Degree not necessary. Salary commensurate with experience. Our employees have been advised. P-1467, Chemical Week.

Chemical Salesman Wanted. Are you limited in your present position? We have need for aggressive individual to associate with new Chemical Division in rapidly expanding national corporation. New York-Washington, D.C. sales area. Industrial chemical sales experience required. Excellent opportunity for the right man. P-1463, Chemical Week.

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POSITIONS WANTED

Director, R&D. Organic chemist. Ph.D.-M.I.T. Diversified industrial experience followed by fifteen successful years Director R&D staff of 50 chemists. Many patents, publications. Desires important, challenging position. PW-1460, Chemical Week.

Manufacturing Chemist: Production, development and quality control experience, supervision, small plant administration in organic chemicals, bulk drugs, and petroleum industries. Producer and problem solver, production specialist. Age 38. Degree. Relocate anywhere. Seek career opportunity with growing company. C. J. Mercer Jr., 1524 College, Davenport, Iowa.

Direction Of Operations Or Systems; Opportunity to use modern methods in planning and control of research or production. Age 29, BChE Princeton, Phi Beta Kappa, grad. work. Experience in supervising manufacturing, product and process development, process design. Has had responsibility for costs and quality control for processing and materials handling operations; administration of incentive wage programs. NYC area preferred, but not essential. PW-1478, Chemical Week.

Research Supervisor: Strong background in product development; proven by international sales. Capable of coordinating research for management and sales. Experienced in technical service for customer relations. Diversified research experience. Ph.D. Age: 44, PW-1372, Chem. Wk.

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Modern processing factory in Karlsurge, Germany, ideal for firm interested in establishing manufacturing facilities with the European common market. Factory sited for distribution in Germany and neighboring countries. Excellent manufacturing, transportation and storage facilities. Now occupied with chemical processing operations, but convertible for other manufacturing. BO-1470, Chemical Week.

Ammonia and Nitric Acid—Is there any small producer in the USA which plant is no longer in condition to compete in the American market due to larger or better located competitor? Good oportunity overseas. Strictest confidence. BO-1471, Chemical Week.

Paper Industry Sales. Many Opportunities Exist. Independent development company, paper specialists and coating chemists, will evaluate products at nominal cost; find paper industry applications. Should you prefer not to handle sales we have major—supplier outlets. BO-1479, Chemical Week.

FOR SALE

3500 gal. Vertical Nickel-Clad Tanks, 6'6" x 12' high, 3' deep cone bottom, Vacuum. Perry Equipt. Corp., 1415 N. 6th St., Phila. 22, Pa.

7'6" x 65' Rotary Kiln, ½" Welded shell, firing hood, 30 HP motor-drive. Perry Equipment Corp., 1416 N. Sixth St., Philadelphia 22, Pa.

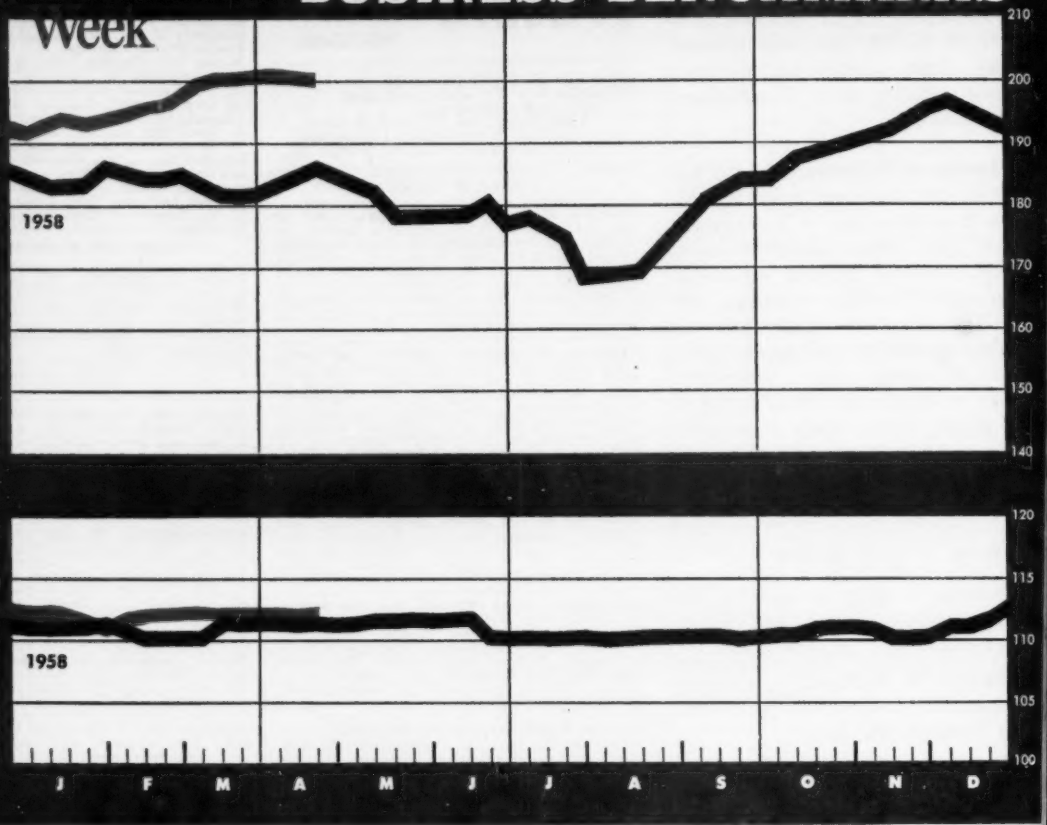
WANTED

1—100 to 300 gal. pebble mill, good condition. Write: W-1480, Chemical Week.

MISCELLANEOUS

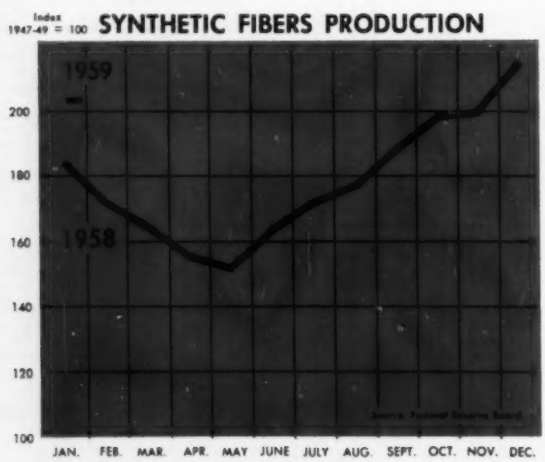
To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow".

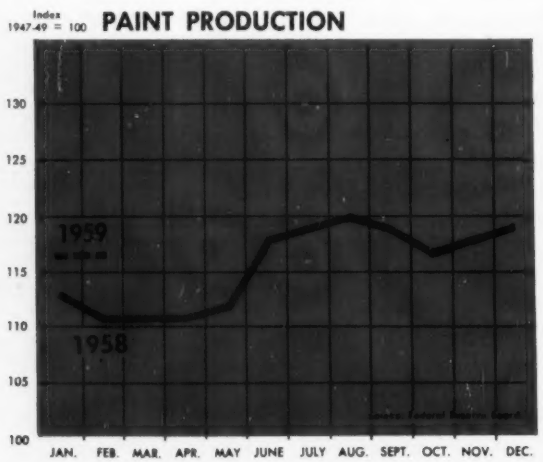
BUSINESS BENCHMARKS



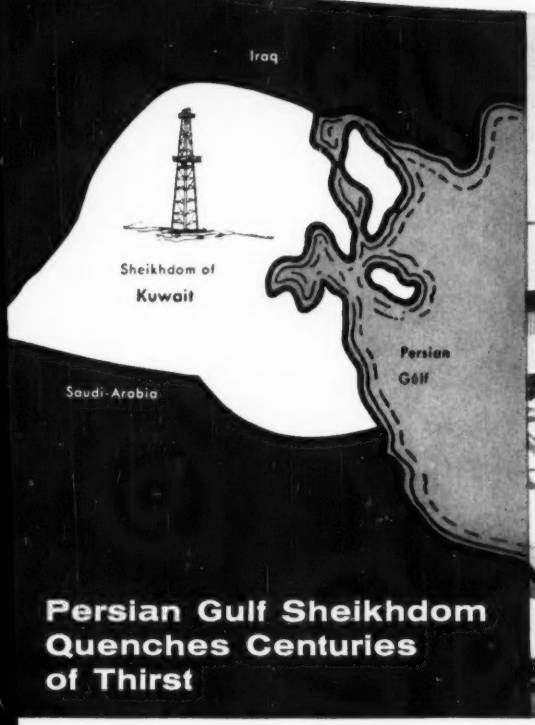
WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-1949=100)	201.3	201.5	183.0
Chemical Week wholesale price index (1947=100)	112.3	112.0	111.0
Stock price index (11 firms, Standard & Poor's)	52.65	52.25	38.27
Steel ingot output (thousand tons)	2,638	2,638	1,308
Electric power (million kilowatt-hours)	12,618	12,709	11,326
Crude oil and condensate (daily av., thousand bbls.)	7,129	7,193	6,267

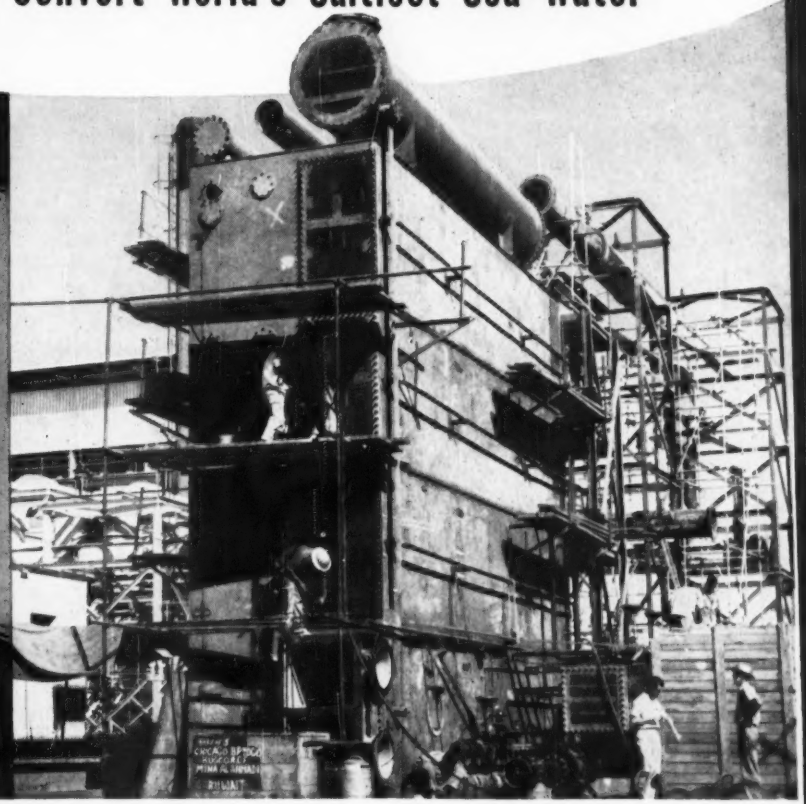
MONTHLY INDICATORS—Employment Production Workers (thousands)	Latest Month	Preceding Month	Year Ago
All manufacturing	12,088.0	11,949.0	11,542.0
Nondurable goods	5,175.0	5,144.0	5,040.0
Chemicals and allied products	527.8	520.4	519.0
Paper and allied products	442.1	439.9	435.7
Rubber products	200.6	198.6	184.0
Petroleum and coal products	155.3	150.9	156.4





CB&I-built Evaporators Convert World's Saltiest Sea Water





Persian Gulf Sheikhdom Quenches Centuries of Thirst

At the tip of the Persian Gulf, between Iraq and Saudi Arabia lies the Sheikhdom of Kuwait, blessed with seven percent of the world's oil and, until recently, plagued with some of the world's most *brackish* drinking water.

Once thirsty Kuwait has now solved its age-old problem. A CB&I-built "flash" evaporation system, designed by Westinghouse, now helps to convert Persian Gulf water—the world's saltiest, with 42,000 parts of dissolved solids per million gallons—into a fresh, potable liquid containing less than 100 parts dissolved solids per million gallons.

The overall system handles 5,000,000 gallons of fresh water daily for the capital city. Conversion is made at a rate of more than three pounds of drinking water *for each pound* of steam consumed.

An unusual installation? Yes, but typical of the world-wide background of experience with which CB&I steel plate specialists can meet the *most specific* customer requirements. This same *craftsmanship in steel* is available to you.

Write your nearest CB&I office for further details on the Kuwait Story and for the brochure: *CB&I Special Plate Structures.*

Above right

● One of two 4-stage flash evaporators built by CB&I and erected by Chicago Bridge Limited, London for Westinghouse International Corporation. "Flash" system replaces "shell and tube" unit—occupies 25 percent less space, handles double the capacity of fresh water.

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